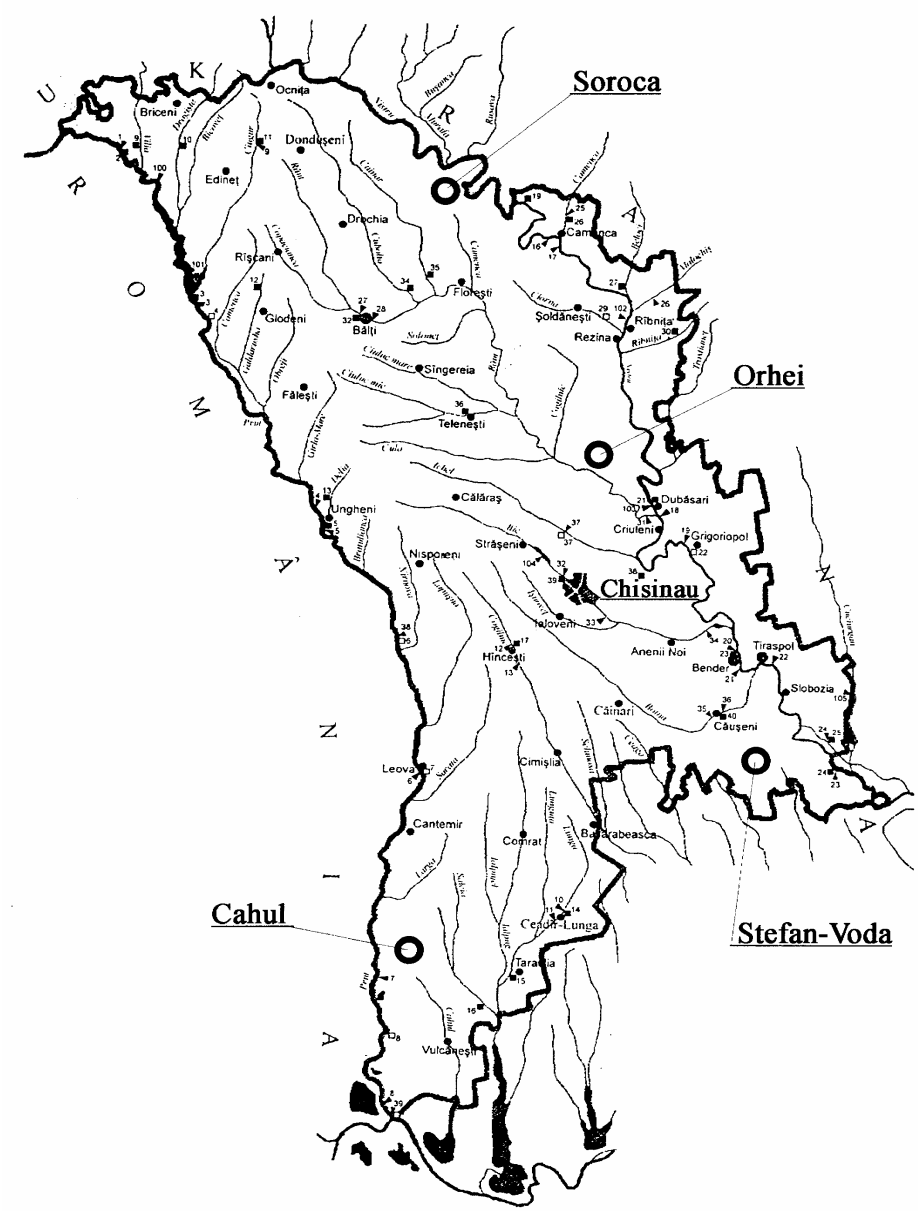
Moldova Apă-Canal Association

EXECUTIVE BOARD

ANALYSIS
of operational and financial performance indicators of water and sewerage utilities in the Republic of Moldova for 2002



CHISINAU 2004

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Introduction

The centralized water and sewerage systems in the Republic of Moldova, which to a great extent shape the social landscape in urban communities and the environmental situation in the country, are in critical condition.

In addition to the long-standing issue of relatively scarce water resources and their uneven distribution across the country, the crisis has been conditioned by unresolved financial/economic, technical and institutional problems that have built up over time and ultimately led to a critical situation in a number of communities. This became especially evident after the liquidation of the centralized administration and funding system and the handover of water and sewerage utilities to local authorities.

The decentralization of the water and sewerage network has brought about a major reduction in the scope of reporting to central authorities, making utility operations more isolated and disjointed and thus complicating the preparation of comparative data on key utility performance indicators and the analysis of the national water and sewerage sector development as a whole.

The condition of the water and sewerage networks in the Republic of Moldova is monitored by the Association of Water and Sewerage Utilities (Moldova Apă-Canal) based on the set of standard indicators developed and commonly used by the World Bank.

Moldova's total population (excluding the left-bank Dniester areas) is 3,617,500, of which 1,499,100 persons live in towns and 2,118,400 in rural communities.

Monitoring covers 41 towns and villages having centralized water supply with a total of 1,538,400 residents.

The indicators resulting from the survey make it possible to evaluate the extent of water and sewerage coverage; the technical and financial condition of water utilities; and the economic and environmental aspects of efficient water use. The analysis, based on a fixed number of indicators, helped generate benchmarking information on utility activities and general water and sewerage service development trends in the country, and provided insight on opportunities for controlling deviations in the operation of the sector.

An important task is the monitoring of indicators to track changes in the various areas of utility operating and financial performance and subsequently use them as a basis for identifying the requisite measures, including investment prioritization.

Based on the available indicators, utility managers and local authorities can effectively assess service quality and the scope of required improvements and investments.

The indicators are multifunctional and make it possible to both evaluate the performance of individual utilities and compare utilities in different communities within Moldova and elsewhere.

Indicators may be used by various potential investors, including international financial institutions, to determine priority areas of involvement in the form of investment support in the water and sewerage sector and technical assistance to utilities.

The applied indicators enable the selection of specific communities as investment targets and the identification of immediate and medium-term investments.

A detailed description of Indicators 1.1-27.1, including definitions, is provided in Appendix 1.

Analysis methodology

To determine the change trends in operational and financial performance characteristic of the water and sewerage sector, a brief nation-wide analysis of the sector was performed for 2001-2002. For some indicators, data for 1996-2002 was used from the Association's earlier analyses.

As small and large towns demonstrate different indicator change dynamics, all communities were classified into the following three groups:

small towns with population not exceeding 15,000;
medium towns with population of 15,000-100,000;
large towns with population above 100,000.

The Chisinau municipality numbering 771,000 residents is considered separately.

In each town group, specific communities were identified where the negative or positive changes in the water and sewerage sector were the most apparent. Such approach enables the identification of critical localities requiring immediate investment and technical or other assistance, as well as areas (segments) of water and sewerage networks where the economic effects of investment will be the highest.

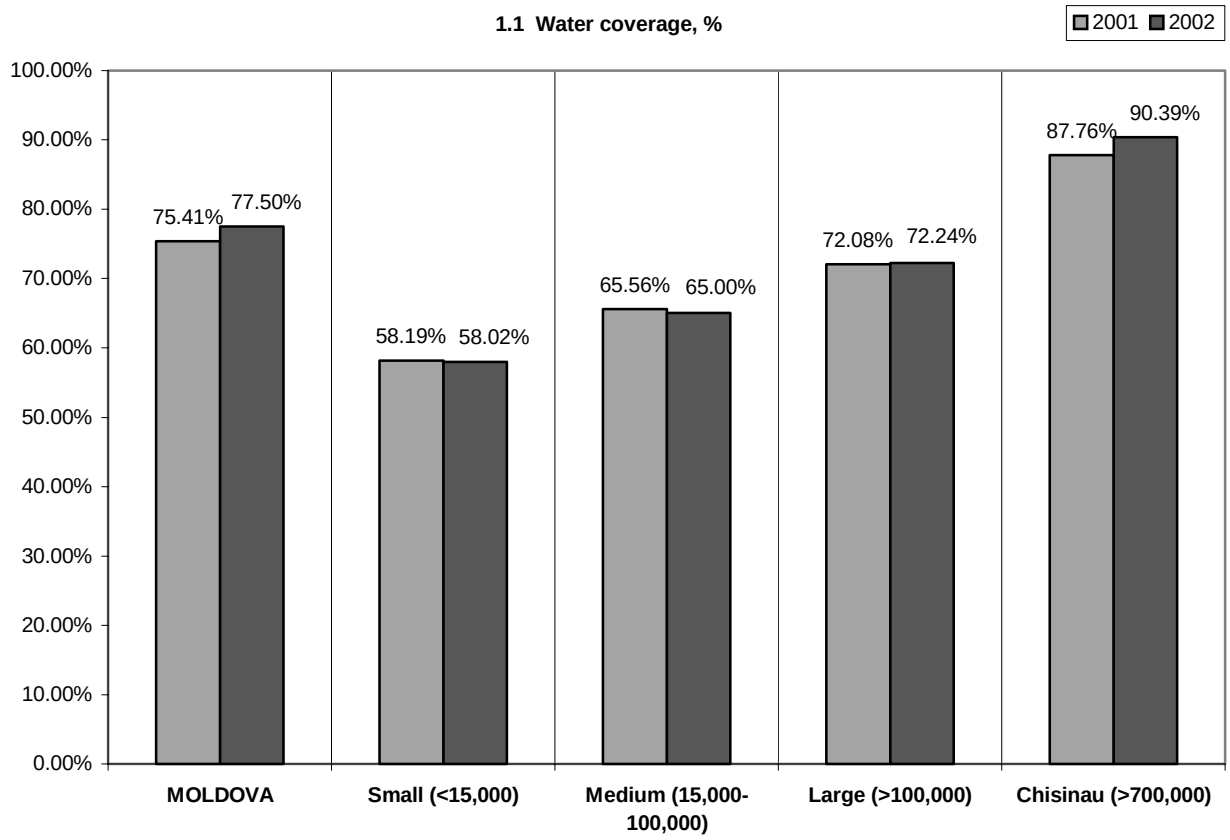
The first part of the report considers utility operational indicators and technical condition of utility systems, followed by analysis of their economic and financial indicators.

Indicators of water and sewerage sector operational performance

A. Coverage
Water coverage (Indicator 1.1)

Water coverage in all communities included in the indicative survey in 2002 totaled 77.5% against 75.4% in 2001, i.e. service coverage increased by 2.1% due to indicator growth for the Chisinau municipality (90.4% compared 87.7% in 2001).

Other towns cannot boast similar dynamics over the 2 surveyed years. In small and medium towns, coverage slightly reduced (by 0.17% and 0.56%, respectively), while in large towns an increase of 0.16% was observed. These changes have been caused by migration due to closure of businesses and loss of jobs, especially characteristic of small and medium towns.



Small and medium towns in Moldova primarily include former district centers. Following the administrative reform, which divided the country into *udetele* (counties), many of such towns (that do not have the status of county centers) have reported a drop in Indicator 1.1.

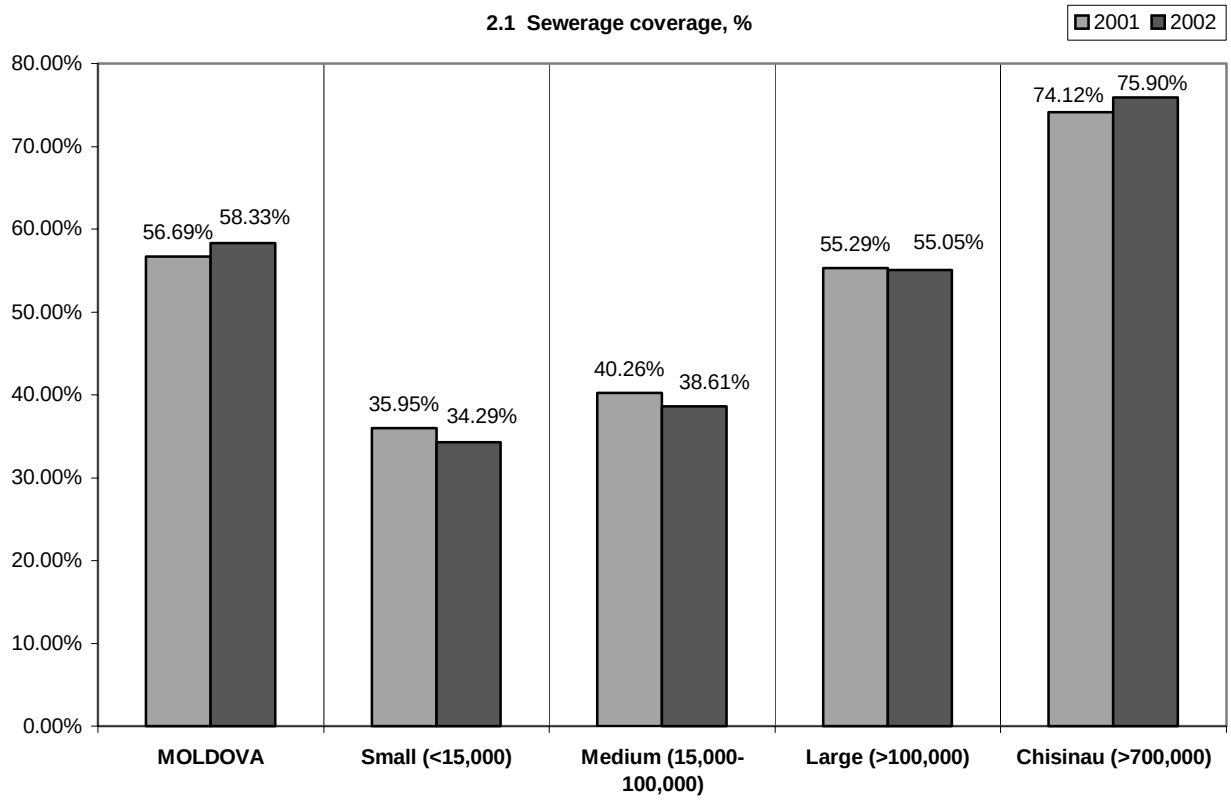
For example, in Nisporeni water coverage declined from 25% in 2001 to 16% in 2002, in Cantemir - from 69% to 44%, in Telenesti - from 28% to 24%, and in the village of Cojusna with a population of 4,400 the system of centralized water supply did not function at all in 2002.

The absence of water coverage growth in small and medium towns also reflects the impoverishment of the population and inability to pay for services and the existence of a considerable number of water wells within city limits, used by residents as water sources.

In large towns, such as Balti, water coverage remained virtually unchanged compared to the previous year, totaling 72.24% against 72.08% in 2001.

Sewerage coverage (Indicator 2.1)

Sewerage coverage in the surveyed towns is much less extensive. Average coverage across the country in 2002 totaled 58.33%, an increase of 1.6% compared to 2001.



The nation-wide growth of indicator 2.1 was due to increased sewerage coverage in Chisinau (by 1.8%).

In small and medium town groups Indicator 2.1 declined by 1.6% in 2002.

The lowest sewerage coverage in 2002 was registered in Nisporeni (14%), Chainari (15%), Vulcanesti (19%) and the village of Cojusna (20%), while in nine more localities coverage did not exceed 30%.

A major part of population in medium and small towns use yard standposts and wells, with no wastewater collection through a centralized sewerage system.

Sewerage coverage in small and medium towns varies from 14% in Nisporeni and Telenesti to 73% in Cahul.

Indicators 1.1 and 2.1 may be used in planning investments in new water and sewerage networks.

Low water and sewerage coverage creates potential opportunities for investments in urban water network development and, accordingly, generation of additional utility revenues. In addition, the development of water distribution networks and sewers will improve the quality of consumed water by phasing out wells and cesspits and will have positive health effects, as the quality of water in the majority of wells does not meet sanitary standards.

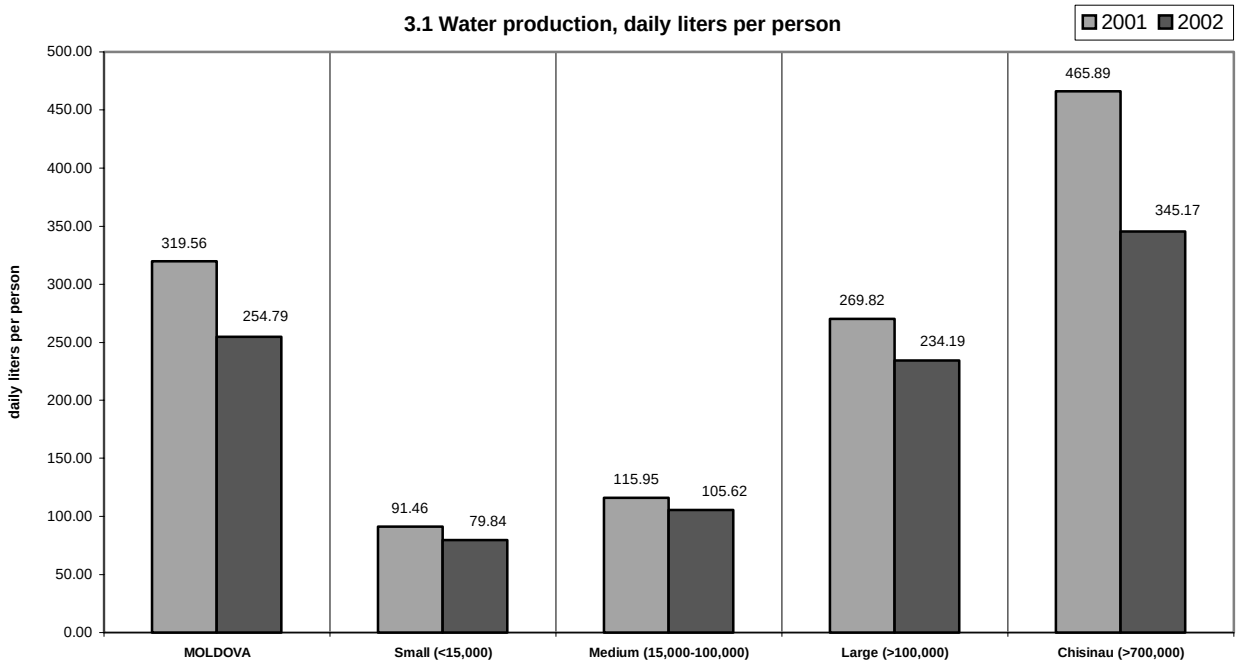
B. Drinking water production and consumption

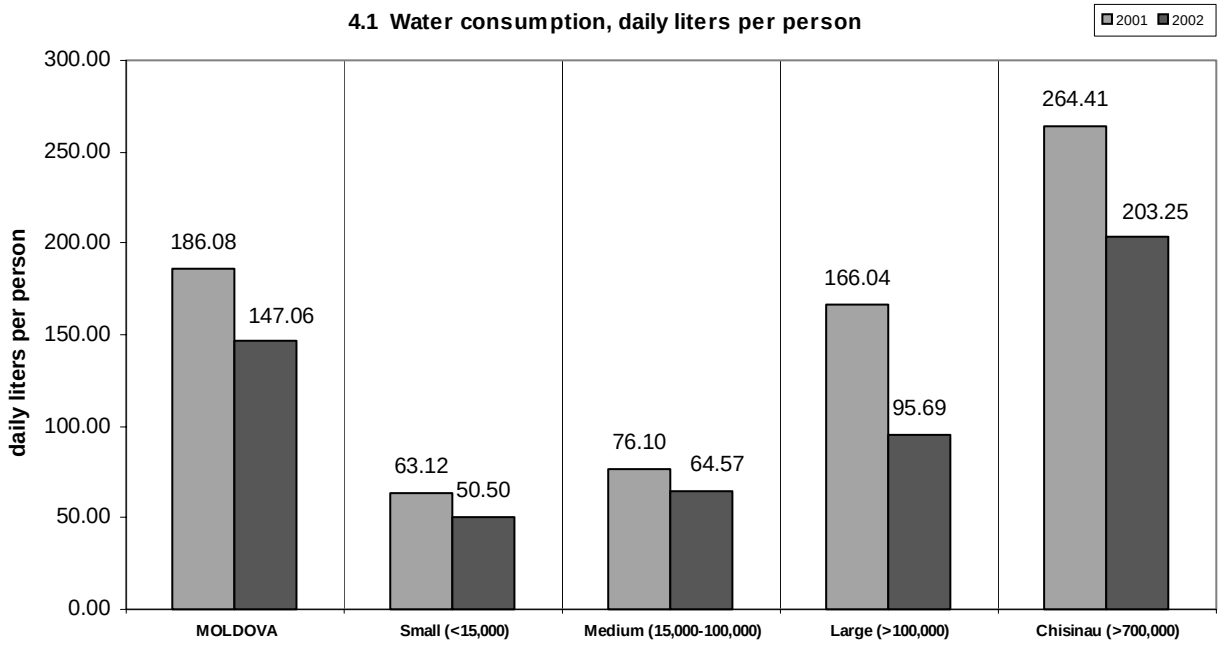
Water production (Indicators 3.1-3.3)
Water consumption (Indicators 4.1-4.3)

These indicators provide a clear picture of water produced and delivered into the water distribution networks, as well as water consumed, in liters per person daily (3.1-4.1); m^3 per connection a month (3.2-4.2) and m^3 per household-apartment a month (3.3-4.3).

Having considered these three indicators, we concluded that Indicators 3.1 and 4.1 (water production and consumption in liters per person daily), calculated based on statistical reporting data, are the most objective, while Indicators 3.2 and 4.2 (production and consumption in cubic meters per connection per month) and Indicators 3.3-4.3 (cubic meters per household a month) may provide distorted information due to imprecise records of connections and households.

In any case, all analyzed indicators show a drastic drop in both water production and unit water consumption in all communities in 2002, including average nation-wide production and consumption. The trend is especially obvious if we consider Moldova's indicators for the five years from 1998 to 2002. Over this period, water production (Indicator 3.1) reduced more than two-fold to 254.79 liters per person daily against 567 liters, while Indicator 3.2 (monthly water production per connection) dropped from 174.76 m^3 to 75.27 m^3, and Indicator 3.3 - from 49.14 m^3 to 20.82 m^3. The fall in water consumption in liters per person daily (Indicator 4.1) in 2002 outpaced the drop in production. Consumption reduced by 2.7 times to 147.06 liters per person against 396.6 liters in 1998. In 2002, the dynamics of Indicators 3.1-4.1 remained the same. Water production (Indicator 3.1) in 2002 compared to 2001 reduced from 319.6 to 254.8 liters per person daily, or by 20.3%, and consumption (Indicator 4.1) declined from 186 to 147 liters per person daily, or by 21%.





Reduced production and consumption of water supplied through centralized distribution networks is first and foremost due to the overall decline in industrial production and the use of own local water supply systems by business entities and budget-financed organizations.

The drop in water production and consumption was especially significant in small and medium communities. For example, in 2002 water production in small towns totaled 79.84 liters per person daily compared to 91.46 liters in 2001 (a 12.7% decrease), while consumption (Indicator 4.1) reduced from 63.12 to 50.5 liters per person daily, or by 20%. Medium towns demonstrate similar dynamics.

Water production (Indicator 3.1) reduced from 116 liters per person daily in 2001 to 105.6 liters in 2002, or by 9%. Consumption (Indicator 4.1) also reduced, going down from 76.1 to 64.6 liters per person daily, or by 15%. In large towns and the capital city, the trend is the same. In 2002, water production in large towns and in Chisinau reduced by 13.2% and 25.9%, and water consumption declined by 42.3% and 23.1%, respectively.

Indicators 3.1-4.1 provide a real picture of changes in water supply services, both nation-wide and by utility.

Notwithstanding that the data on the volume of produced and consumed water per consumer covered by centralized water services (Indicators 3.1 and 4.1) also incorporate water delivered to budget-financed organizations and business entities, these indicators make it possible to assess actual water consumption by residential customers, especially in small and medium towns, where residential consumption (without business entities and budget-financed organizations), constitutes 79-80% of total water consumption.

In the capital city, with its better-developed and preserved industrial sector, residential consumption in 2002 totaled 63.2%. Actual consumption per person (net) in 2002 stood at 40.4, 51.7 and 76.5 liters per person daily in small, medium and large towns and 128.5 liters per person daily in Chisinau.

The analysis of average national consumption and consumption in individual communities (Indicator 4.1) reveals very low consumption levels, especially in small and medium towns where it varies from 12.6 liters per person daily (Glodeni, Soldonesti, Straseni) to 100-119 liters (Cricova, Ungheni and other localities).

Reduced water production and consumption are due to:

- lower consumption by industrial consumers;
- increase in unaccounted-for water (Indicator 6.1);
- irregular water service (Indicator 15.1);
- significant water tariff growth (Indicator 18.1);
- poor collection (Indicator 23.1).

These indicators are discussed in more detail further.

Given the technical condition of water and sewerage networks, and the state of utilities' technology and finances, it is evident that neither the operators nor local authorities that own the systems are able to resolve the existing problems without external investments (funded by the state or international organizations) in facilities modernization.

Raising the quality of residential water service has been declared a strategic government task aimed at improving public health, however so far lack of funds has obstructed the implementation of the Government program for water and sewerage network development to 2006.

Metered water consumption (Indicators 5.1-5.3)

Given the declining service volumes and significant tariff hikes, including residential charges, the task of consumption metering goes beyond a merely commercial issue, as metering will allow utilities to more precisely estimate water production and consumption across all consumer groups.

Several indicators that characterize the level of metering (specifically, Indicators 5.1-5.3 and 7.1-8.1) show that metered daily consumption per person (Indicator 5.1), per connection a month (Indicator 5.2) and per household (Indicator 5.3) continued to decline in 2002. Indicators 5.2 and 5.3 exhibit a better dynamics.

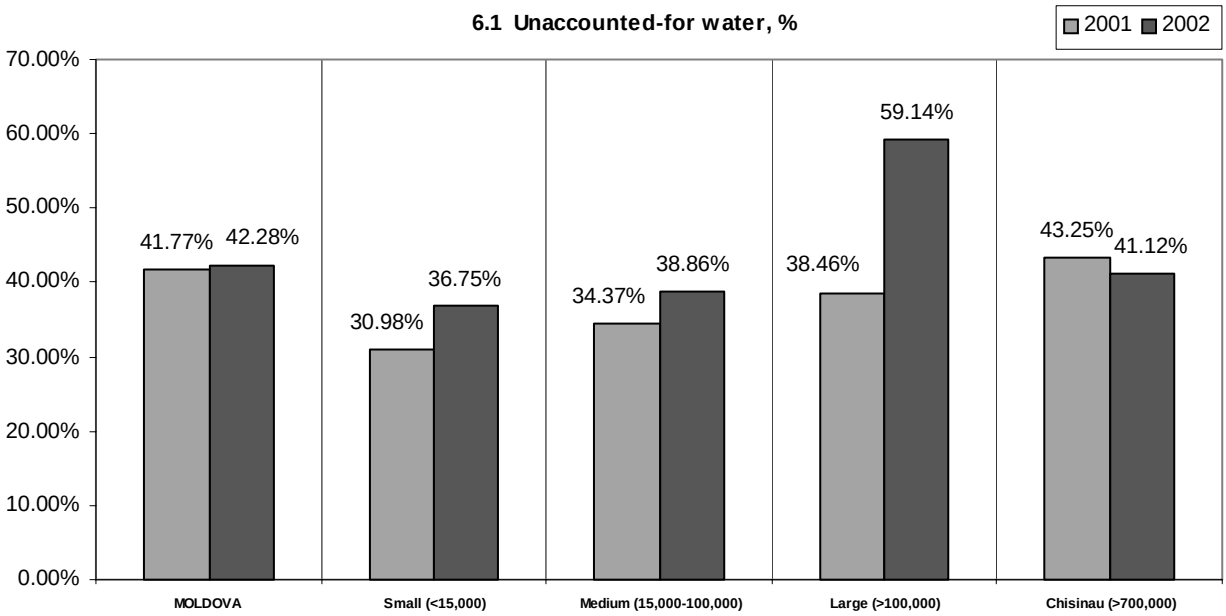
It appears practicable to use these indicators for assessing changes within a given utility, as inter-town comparisons are difficult because of different values included in calculation formulas.

C. Unaccounted-for water

Unaccounted-for water (Indicators 6.1-6.3)

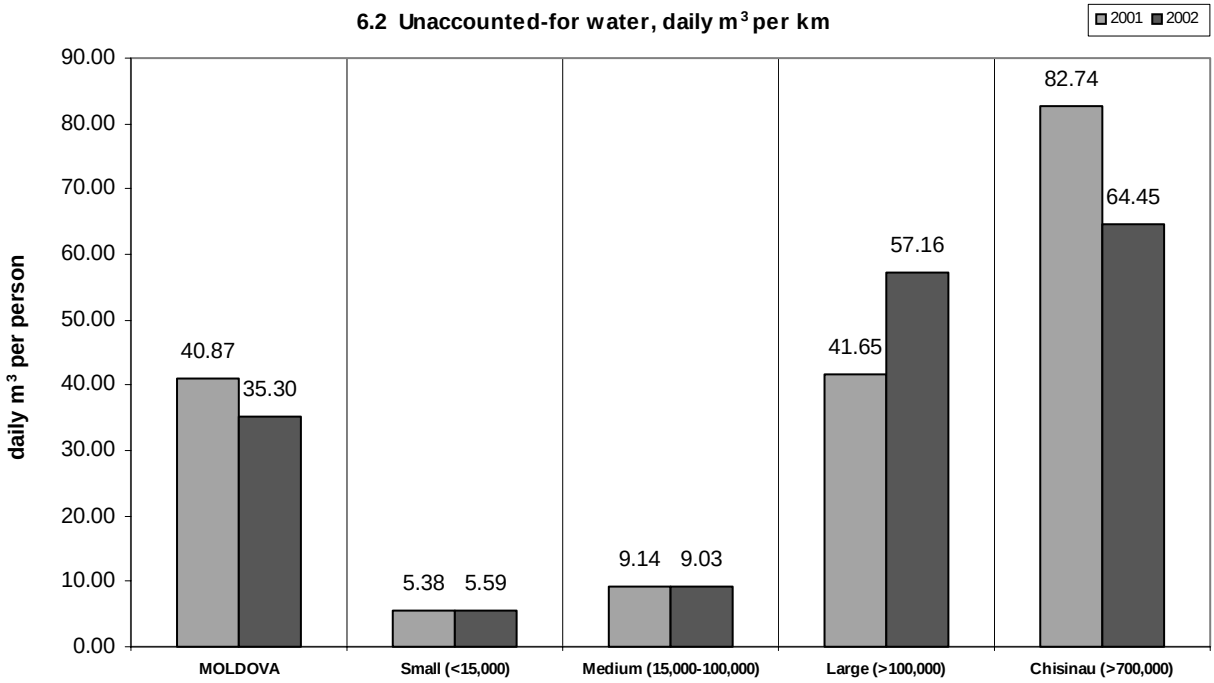
This indicator characterizes network water losses and water remaining unaccounted for by commercial meters, and is defined as the difference between produced potable water delivered to the water distribution network and billed water.

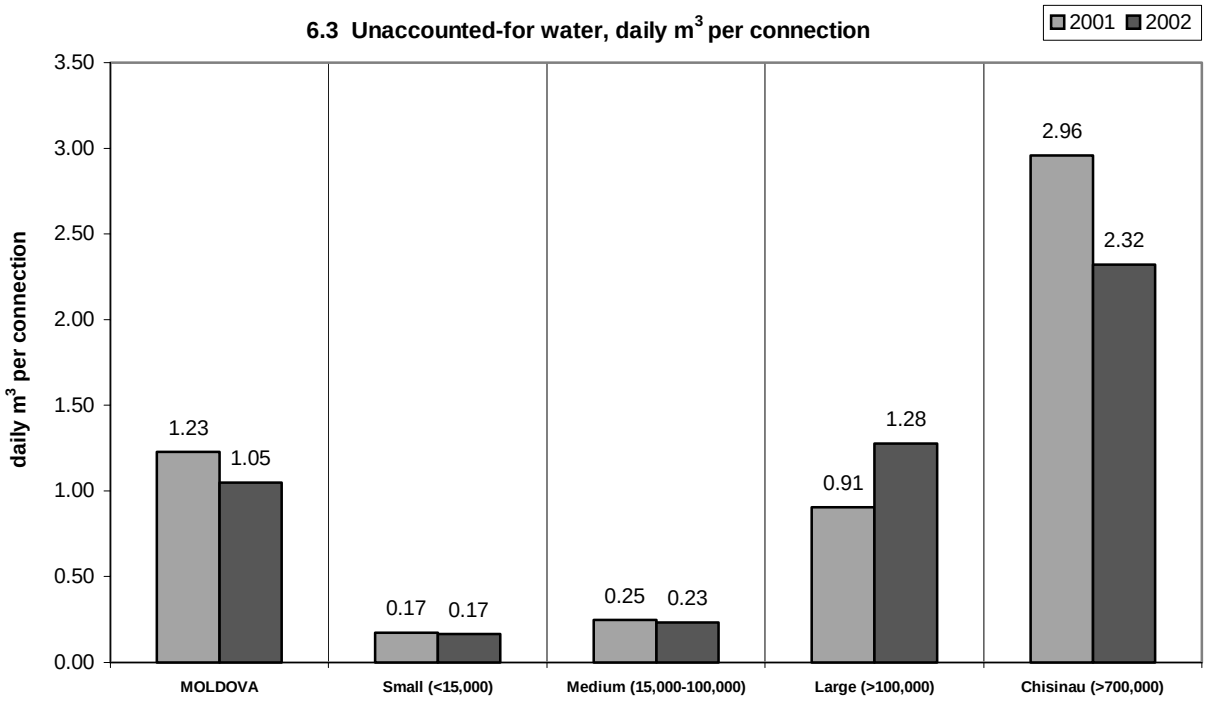
Indicator 6.1 continued to grow in 2002, both on nation-wide scale (from 41.77% in 2001 to 42.28% in 2002) and in town groups (from 30.98% to 36.75%, 34.37% to 38.86%, and 38.46% to 59.14% in small, medium and large towns, respectively), with the exception of the capital city, which reported a slight reduction from 43.25% in 2001 to 41.2% in 2002.



The steady negative dynamics of Indicator 6.1 stems from the following:

- continuing decline in water consumption;
- absence or insufficiency of investments in replacement of dilapidated networks;
- use of low-end water meters unable to register consumption below 10-15 liters per hour and allowing water theft by consumers;
- restricted water supply, in some towns limited to 2-4 hours per day (Calaras, Drochia, Falesti, Straseni, etc).





The change pattern of indicators 6.2 and 6.3 (daily water losses per km of network and per connection) is similar to that of Indicator 6.1, yet in small and medium towns these indicators in 2002 remained at 2001 levels due to the continuing decline in consumption and partially owing to the divestiture of corporate and other in-house water network to utilities.

In large towns (Balti), Indicator 6.2 (daily water losses per km of network) increased by 37% over 2002, as also confirmed by a 15.6% rise in Indicator 9.1 (annual pipe breaks per km).

Reduced losses per km (Indicator 6.2) in Chisinau in 2002 against the backdrop of a stable number of pipe breaks (Indicator 9.1) resulted from the replacement of 10% of water mains that were in critical condition and from elimination of a large number of hidden leaks after the installation of up-to-date detection equipment.

Indicators 6.1, 6.2, 9.1, 9.2, both nation-wide and for individual towns, are a multiple of average performance by foreign utilities with stable service quality, e.g. in UK (unaccounted-for water - 10-20%, annual breaks per km - 0.2-0.3). This indicates the need of immediate and medium-term investments in replacement of dilapidated networks in nearly all towns covered by the survey.

In certain localities, the condition of networks is especially poor (see Table *C 1*):

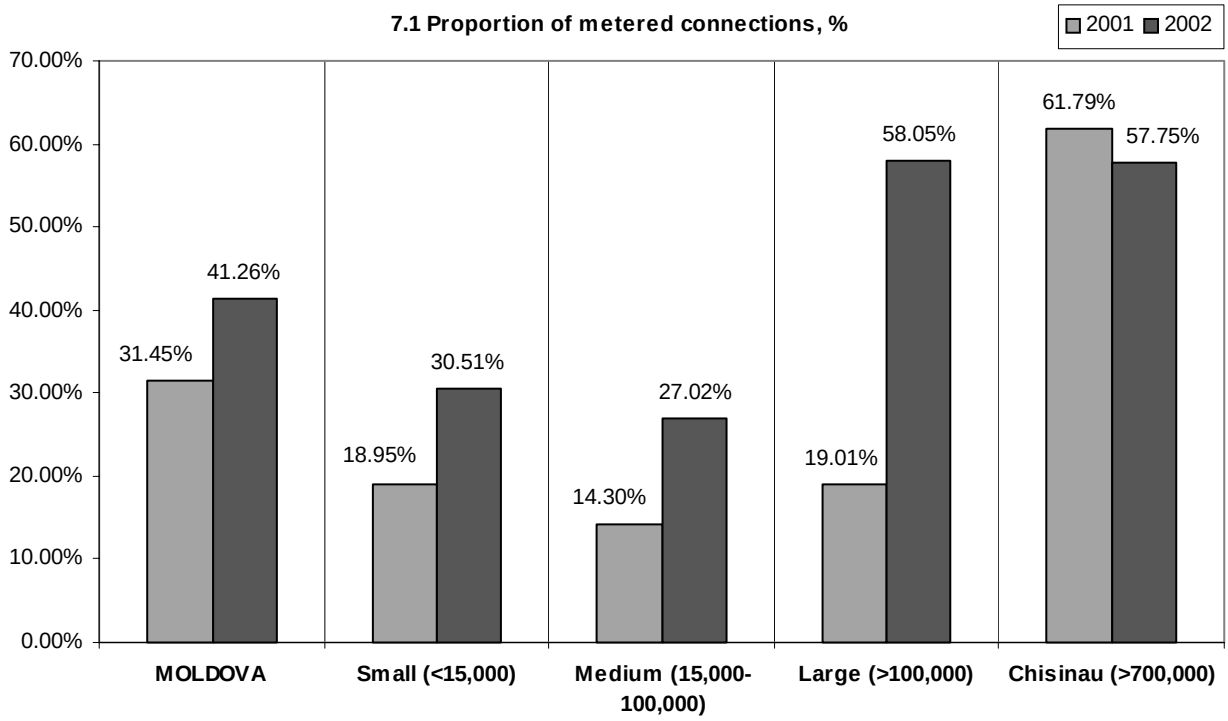
Table C 1

Town	Indicator 6.1 (unaccounted-for water, %)		Indicator 9.1 (annual breaks per km)	
	2001	2002	2001	2002
Balti	38.0	59.0	14.7	17.0
Cahul	35.0	37.0	0.72	3.25
Chauseni	56.0	41.0	1.14	1.03
Drochia	47.0	46.0	1.51	2.87
Soroca	25.0	27.0	12.01	12.23
Edineti	50.0	52.0	0.73	1.02
Glodeni	67.0	56.0	0.72	0.92
Leova	44.0	58.0	2.35	3.08
Stefan voda	52.0	70.0	5.85	9.74
Straseni	44.0	60.0	2.97	3.10
Telenesti	73.0	56.0	10.9	7.92
Vulcanesti	50.0	53.0	0.63	0.70
Riscani	22.0	37.0	4.46	7.61

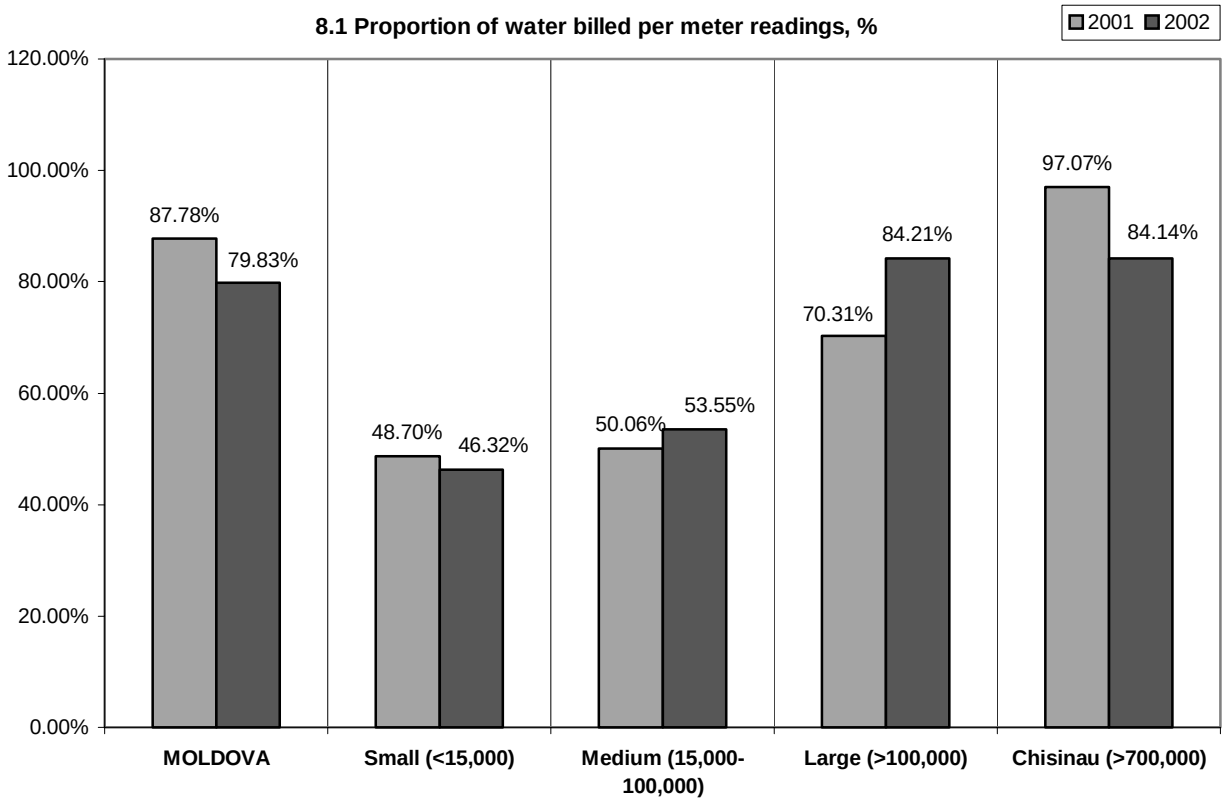
D. Metering practices

Proportion of metered connections (Indicator 7.1)
Proportion of water billed per meter readings (Indicator 8.1)

Indicator 7.1 (proportion of metered connections) in 2002 increased considerably, totaling 41.26% nation-wide and 30.5%, 27.0% and 58% in small, medium and large towns, respectively. In some localities (Criuleni, Cricova and the village of Stauceni) this figure reaches 71-77%. Such solid growth, from 22% in 2000 to 41.0% in 2002, was fueled by further tariff increases.



The proportion of water billed per meter readings (Indicator 8.1) in 2002 declined compared to 2000, from 85% to 80% nation-wide, due to the drop in Chisinau where the indicator reduced from 96% in 2000 to 84.1% in 2002. The drop was conditioned by further decline in consumption and the use of in-house wells by some enterprises. All other town groups demonstrate steady growth in the number of consumer meters installed.



Indicator 8.1, characterizing the ratio of metered water to total billed water expressed as a percentage, demonstrates the same pattern of changes in small and large towns and Chisinau as Indicator 7.1, albeit on a much smaller scale. In small towns, Indicator 8.1 in 2002 reduced by 2.4%, despite the growth in metered connections, and Indicator 7.1 declined from 19% in 2001 to 30.5% in 2002. The difference in change dynamics per Indicators 7.1 and 8.1 is due to the following factors:

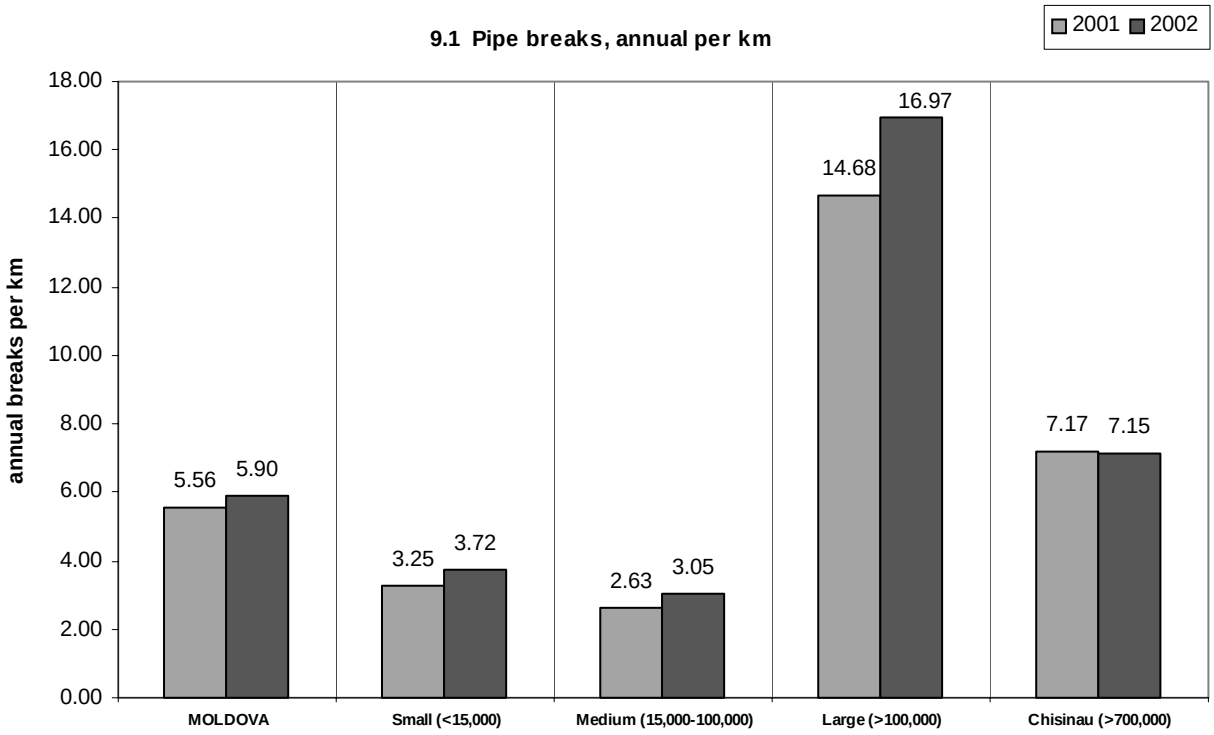
- reduced consumption, both total billed and metered (in daily liters per person), as illustrated by Indicators 4.1 and 5.1;
- growth of unaccounted-for water (Indicator 6.1).

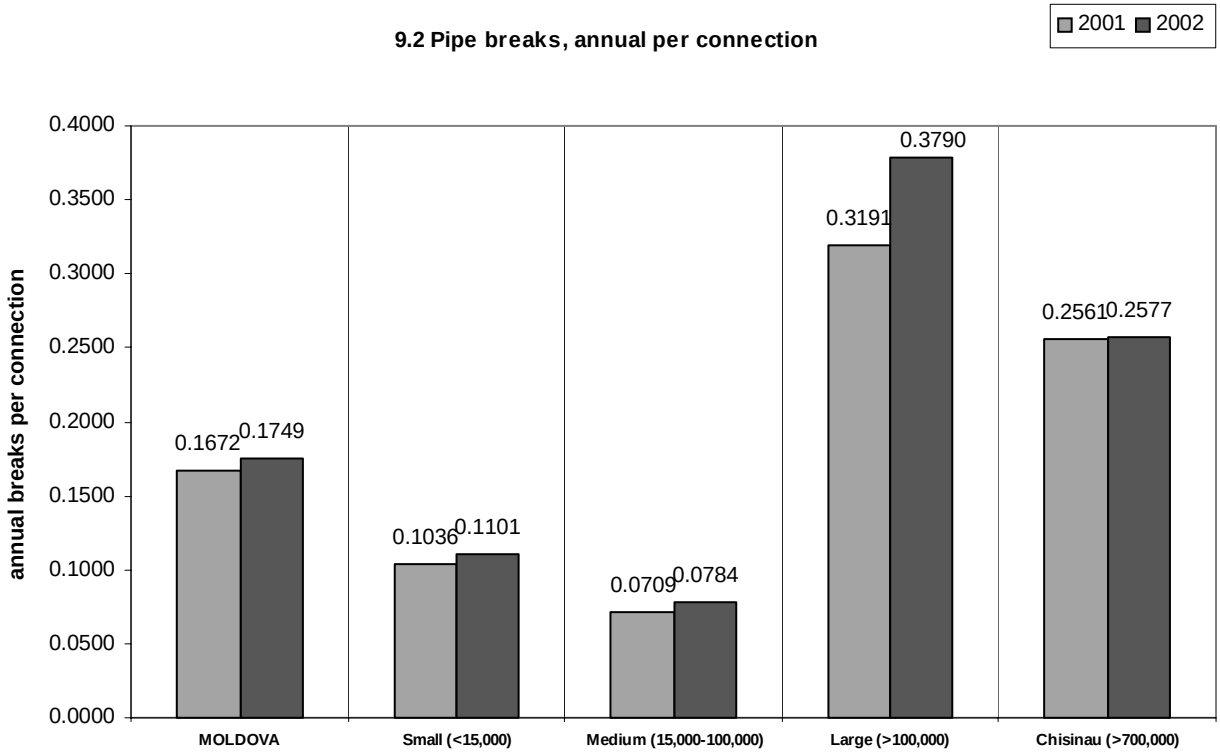
The installation of meters helps reduce unit consumption (in daily liters per person) through stricter water limits for budget-financed organizations, promotion of rational water use by consumers with meters, and prevention of potential water theft.

E. Network performance

Pipe breaks (Indicators 9.1-9.2)

In 2002, Indicators 9.1-9.2 demonstrated further growth. The number of breaks across the country totaled 5.9 per km of networks, with 3.7 and 3.0 breaks per km in small and medium towns, respectively. In large towns (Balti), the value of this indicator (17 breaks per km annually) reflects the extremely poor state of water networks, however any further conclusions would require a more detailed analysis of both the breakdown registration system and the nature of failures as such.


9.1 Pipe breaks, annual per km
2001
2002
annual breaks per km
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
5.56
5.90
3.25
3.72
2.63
3.05
14.68
16.97
7.17
7.15
MOLDOVA
Small (<15,000)
Medium (15,000-100,000)
Large (>100,000)
Chisinau (>700,000)


9.2 Pipe breaks, annual per connection
2001
2002
annual breaks per connection
0.4000
0.3500
0.3000
0.2500
0.2000
0.1500
0.1000
0.0500
0.0000
0.1672
0.1749
0.1036
0.1101
0.0709
0.0784
0.3191
0.3790
0.2561
0.2577
MOLDOVA
Small (<15,000)
Medium (15,000-100,000)
Large (>100,000)
Chisinau (>700,000)

Both indicators exhibit similar dynamics and growth across all towns, with the exception of the capital city where 2002 performance changed little against 2001.

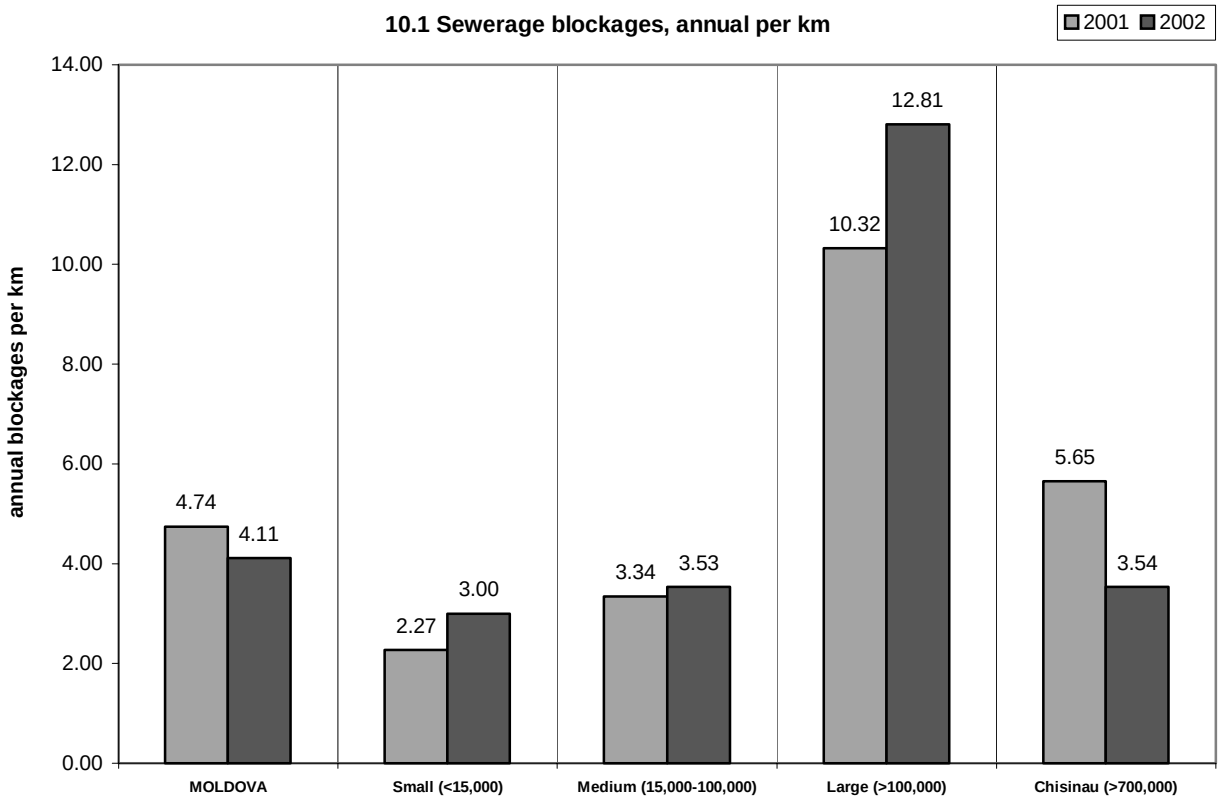
The high failure rate is conditioned by network obsolescence, restricted-schedule water supply in many towns provoking additional water hammers in the networks and more breakdowns, and excessive pressure in distribution lines due to insufficient network zoning and pumping equipment overcapacity.

The highest breakdown incidence is observed in Balti (17.0 breaks per km of networks annually), Nisporeni (9.8 breaks), Rezina (13.3), Riscani (7.6), Soroca (12.2) and Telenesti (7.92).

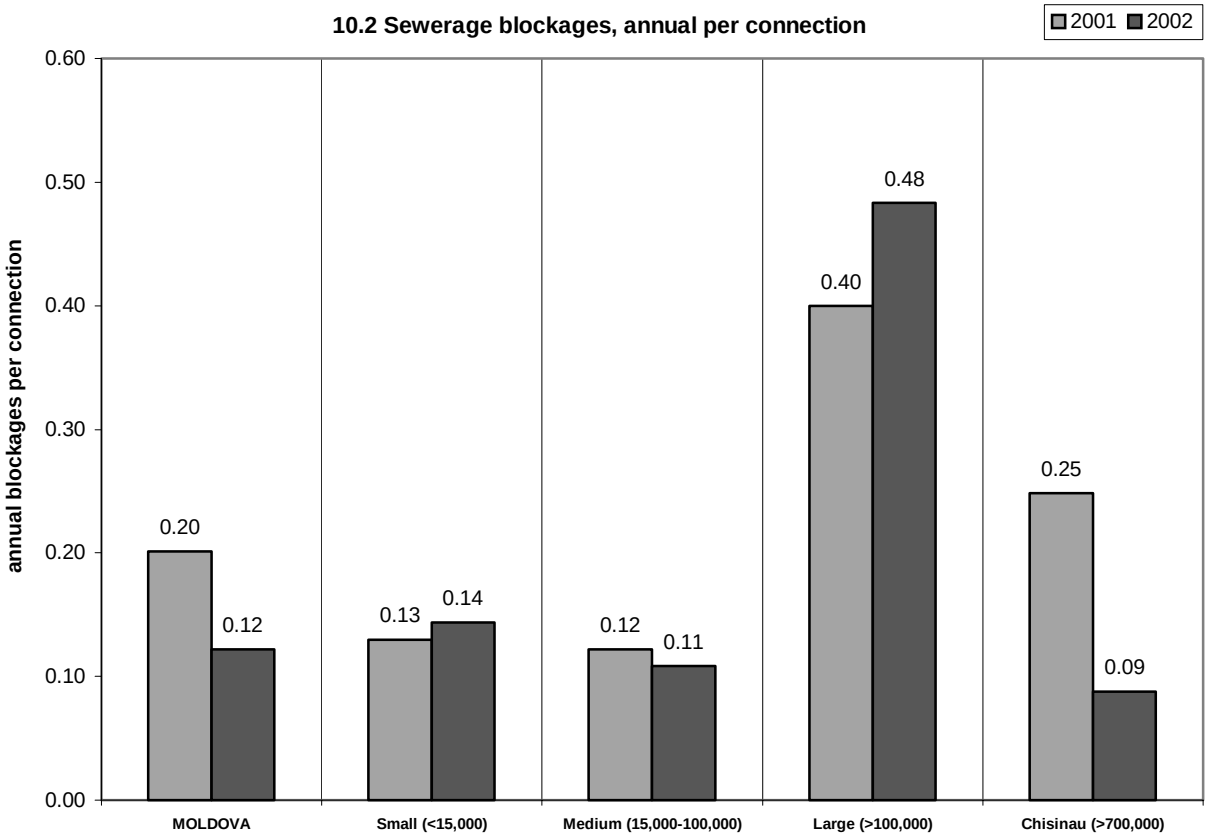
All of the above towns are characterized by irregular terrain, zonal water supply and a more than two-fold drop in water consumption over the last five years.

Sewerage blockages (Indicators 10.1-10.2)

Indicators 10.1 and 10.2 over 2001-2002 reduced across the country from 4.95 to 4.11 annual breakdowns (blockages) per km and from 0.21 to 0.12 annual blockages per connection, respectively. However, these numbers largely reflect the situation in Chisinau, where the failure rate reduced from 4.58 blockages per km in 2000 to 3.54 blockages in 2002. As Chisinau accounts for 81% of total urban wastewater in Moldova and 47% of the total length of sewerage networks in the country, the nation-wide values of these indicators are significantly affected by the performance of water and sewerage networks in the capital city.



All other town groups demonstrate further growth in the number of annual sewerage blockages per km (Indicator 10.1) in 2002: by 32%, 6% and 24% in small, medium and large towns, respectively.



Indicator 10.2 (annual sewerage blockages per connection) reflects a similar incidence growth trend among small and large towns, albeit at a slower pace: 7.7% in small towns and 20.0% in large towns in 2002. Medium towns exhibit a slight drop in Indicator 10.2, however this can possibly be a result of inaccurate data on the number of connections.

Of the two measures, Indicator 10.1should be viewed as more important.

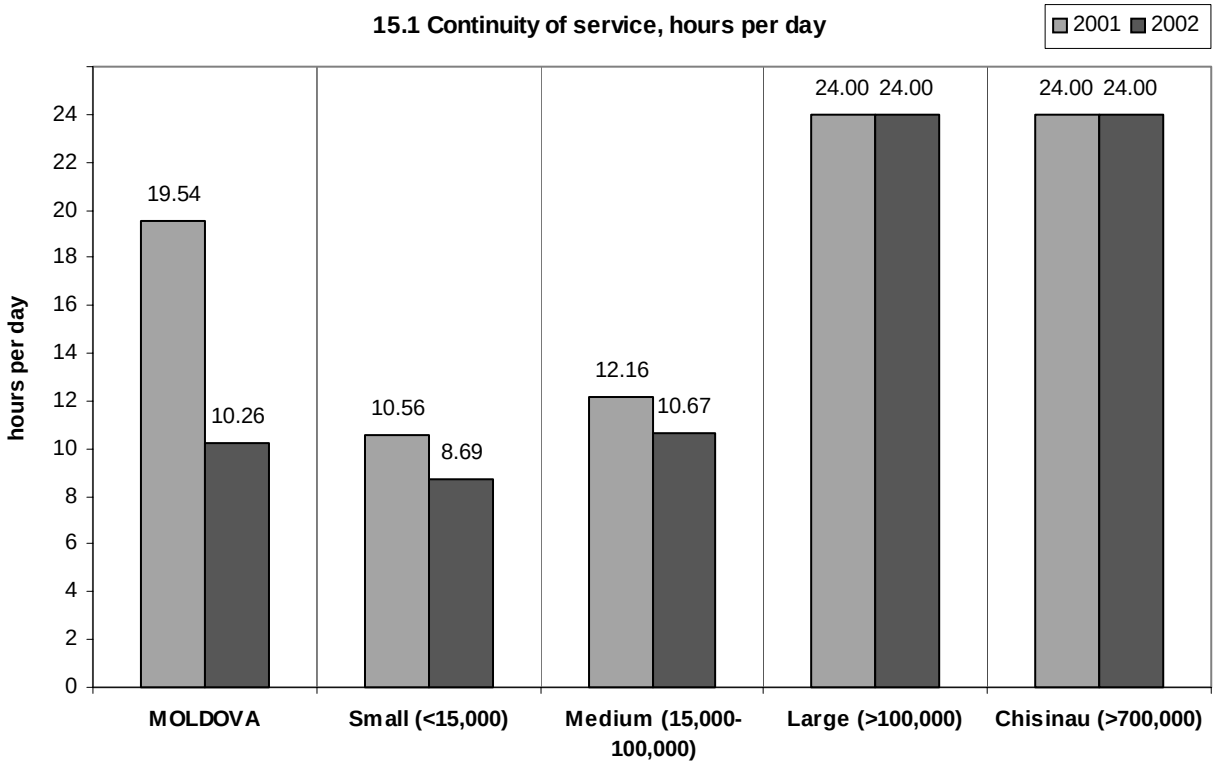
Growing sewerage failure rate is conditioned by the following factors:

- further decline in water consumption (Indicator 4.1), by 21.0% over 2002;
- increase in water network breakdown rate (Indicator 9.1) by 6.1% in 2002;
- reduced uninterrupted water service (Indicator 15.1), by 47.5% in 2002.

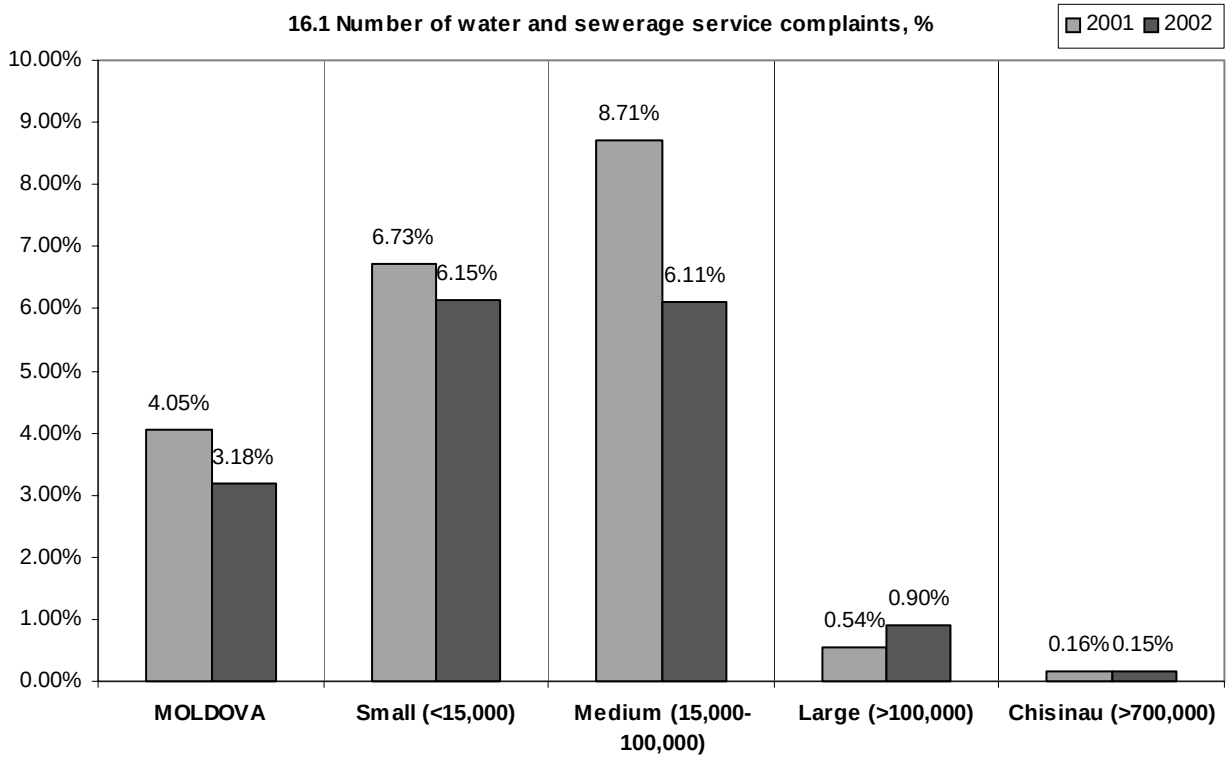
G. Quality of service

Continuity of service (Indicator 15.1)
Number of water and sewerage service complaints (Indicator 16.1)

Indicator 15.1 characterizes the length of uninterrupted daily water and sewerage service, which in 2002 continued to decline and totaled 10.26 hours per day across Moldova. Only five towns, including Chisinau, provide round-the-clock water and sewerage service. In several towns (Calaras, Drochia, Riscani, Straseni, etc.), water is supplied only three of four days a week for 2-4 hours. In some communities, water distribution networks are in critical condition, provoking outbursts of such diseases as dysentery, hepatitis etc. (Straseni, Calaras).



The ratio of water and sewerage service complaints to the number of connections (Indicator 16.1) reduced in 2002 to 3.18% and 6.1-6.2% across the country and in small and medium towns, respectively. In large towns and the capital city the ratio is below 1%.



The change pattern of Indicator 16.1 is in no way indicative of improving service quality. Presumably, the reduction may be due to flaws in complaint registration procedures or the fact that consumers have become accustomed to poor service and realized the futility of addressing public authorities with complaints, given that because of the lack of investments no renovation of water and sewerage networks is performed, except in Chisinau and a handful of other towns. Moreover, customer complaints do not improve the quality of service, while the cost of services increases and service charges at many utilities fail to cover operational costs, which forces them to further curtail water supply.

In some towns (Donduseni, Cantemir, Telenesti, Straseni) the rate of complaints in 2002 totaled 24%-62%.

Wastewater treatment (Indicator 17.1)
Quality of wastewater treatment (Indicators 31.01-31.04)

The analysis of Indicator 17.1 shows that in 2002 all 41 utilities covered by the indicative survey processed wastewater at own treatment facilities and partially delivered it for treatment to facilities ran by other ministries and agencies, including in other towns.

Importantly, all wastewater is being processed at treatment facilities.

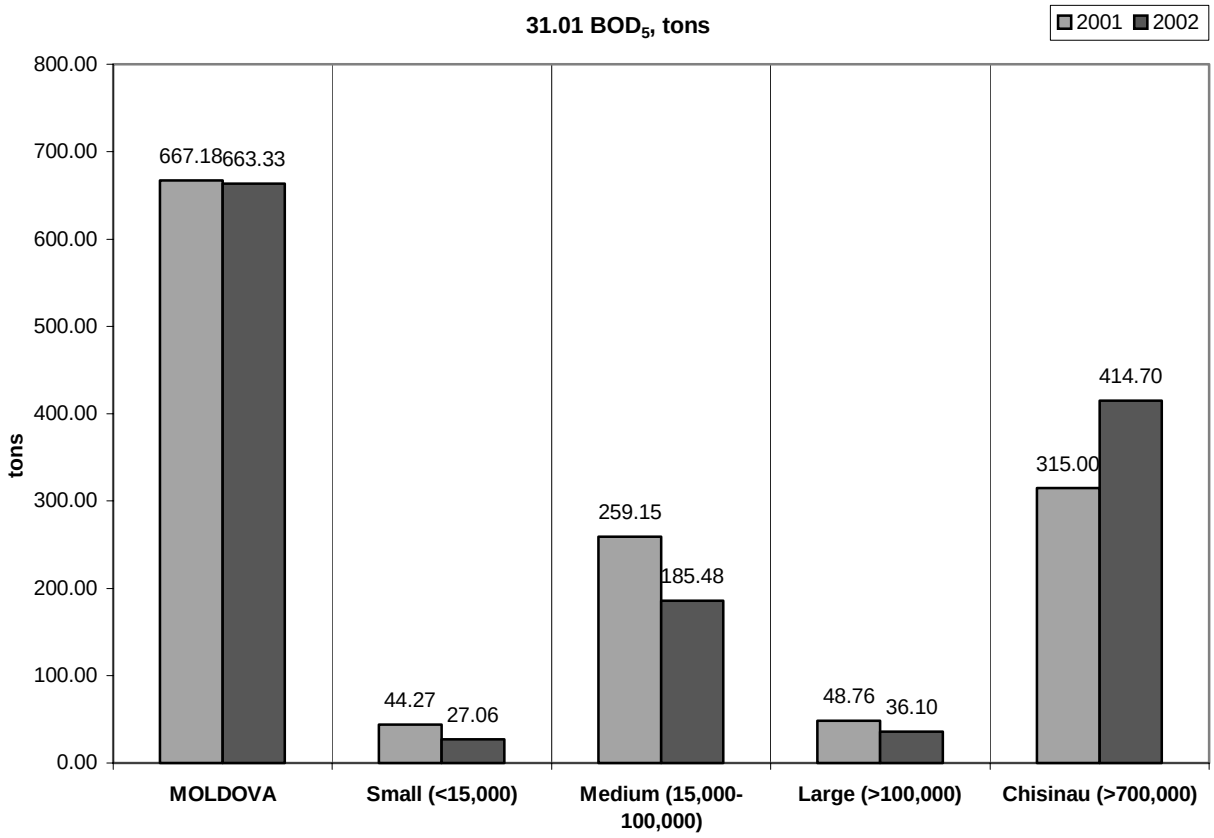
The introduction of water delivery and consumption metering made it possible to scale down intake from water sources and reduce the volumes of discharged wastewater. For example, in 2002 wastewater discharge across the country (per the surveyed towns) declined by 7% and 25% compared to 2001 and 2000, respectively, totaling 54.71 million m^3.

Due to a dramatic drop in wastewater disposal, some facilities have remained idle and disintegrated over time, especially in small towns (Donduseni, Telenesti, Cantemir, Chainari), and wastewater is often pumped into the former oxidation (sewage) ponds for purification, partial evaporation and further discharge in water courses. The actual volumes of wastewater in small towns do not exceed 10% of available capacity (e.g. in Telenesti and Briceni treatment facilities have daily throughput capacity of 3,500 and 8,000 m^3, while the average daily volume of incoming wastewater is a mere 220 and 154 m^3, respectively).

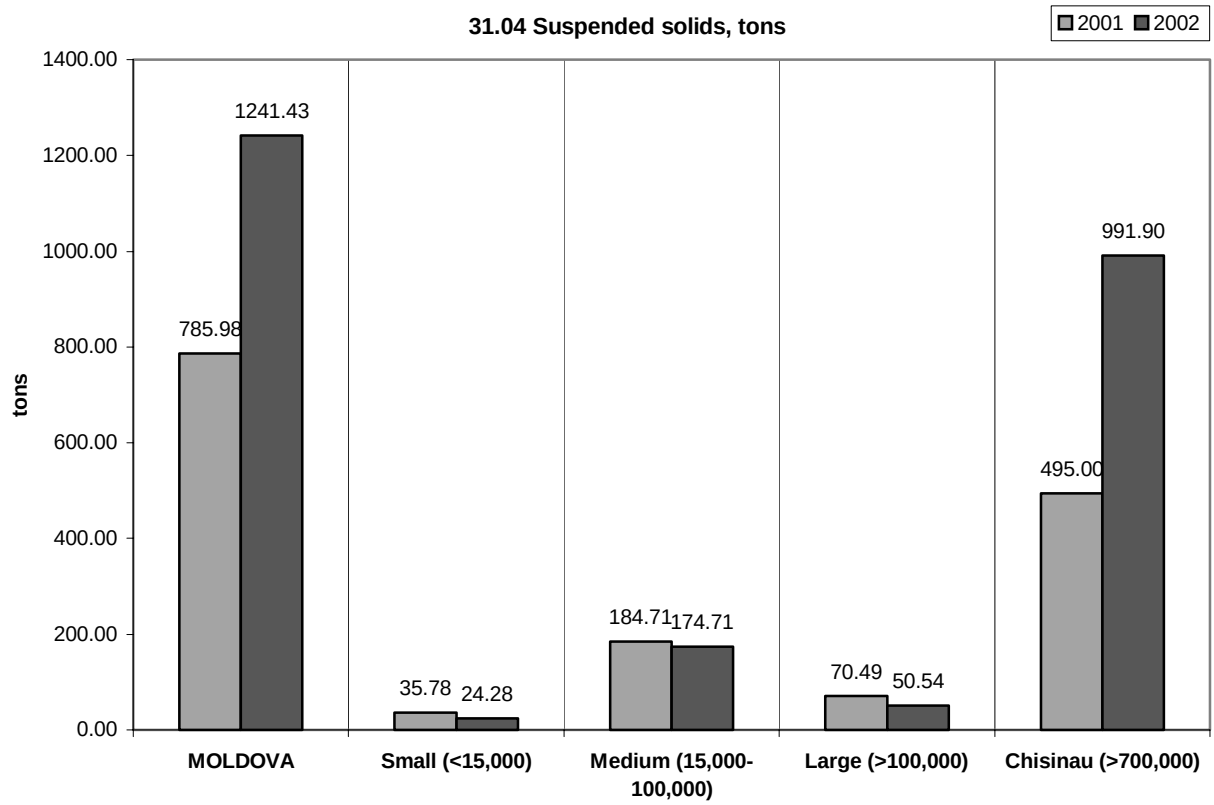
Given the absence of information on the condition and quality of wastewater processing at sewage facilities ran by other operators, the analysis focuses on Indicators 31.01-31.04 (BOD_5 and suspended solids discharge).

Nitrogen and phosphorus discharge has not been considered as such analysis is not performed by all utilities.

The analysis of Indicators 31.01-31.04 for 2001-2002 shows that wastewater BOD_5 discharge in 2002 remained virtually unchanged compared to 2001 (663 tons against 666 tons in 2001), despite the overall reduction in wastewater volumes.



Suspended solids discharge across the country increased by 36.7% in 2002 and totaled 1,241.4 tons.



The analysis shows that the bulk of wastewater pollutants falls on Chisinau, which accounts for 80% of total suspended solids discharge in Moldova. Post-treatment suspended solid concentrations in Chisinau increased from 11 mg/l in 2001 to 13.4 mg/l in 2002 and totaled 991.9 tons. BOD_5 concentration in 2002 stood at 9.34 mg/l against 7 mg/l in 2001, with a total of 414.7 tons, or 62.5% of country-wide discharge.

Despite low pollutant concentrations in treated wastewater in Chisinau and the declining pollutant discharge in small and medium towns, average concentrations have been on the rise since 1996. Country-wide BOD_5 and suspended solids discharge increased from 6.9 mg/l to 12.12 mg/l and from 11.1 mg/l to 22.69 mg/l, respectively, with a concurrent major increase in similar pollution loads in 2002 among small towns (to 15.8 mg/l and 14.2 mg/l) and medium towns (38.6 mg/l for BOD_5 and 36.4 mg/l for suspended solids). This is yet another proof of a steady downward trend in the quality of wastewater treatment by utilities, as mentioned in previous reports.

The above data demonstrate that average pollution loads in Moldova range from 12 to 22 mg/l, while the statutory limit for fishing water bodies is 3-5 mg/l, a figure that is unattainable in current conditions. This indicates the need of revising the existing laws and regulations and their harmonization with European standards. Moldova is still using the Rules of Surface Water Protection developed in the former USSR, which are based on the concept that concentration of toxic substances in water "should not have an adverse impact, direct or indirect, on humans, animals or fish". Limit-setting procedures used in the past proceeded from health criteria only, disregarding the available treatment techniques or economic and environmental practicability.

The existing system of environmental standards and limits must be revised with account of the new economic and social environment, based on the national Concept of Ecological Policy adopted by Moldova in 2002, which declares the "revision of existing laws and regulations and their harmonization with European standards, and adaptation or development, if required, of the relevant application mechanisms". In selecting targets for environmental investments, it is unreasonable to proceed from such 'tight' standards as are in effect in Moldova, because this would require construction of complex and costly systems for advanced wastewater treatment. It appears even less practicable in the light of softer requirements for pollutant concentrations introduced by Romania and Ukraine (20 and 60 mg/l for BOD_5 and suspended solids in Romania and 15 mg/l in Ukraine).

Treatment facilities in communities with pollution levels above 20-25 mg/l, which is consistent with EU standards, may be suggested as potential investment targets. The list of such communities is enclosed (see Table *G 1*).

Table G 1

Town	BOD_5 concentrations (after treatment), mg/l	Suspended solids concentration (after treatment facilities), mg/l
Cantemir	80	40
Telenesti	64	22
Cricova	53	62
Taraclia	11	72
Vulcanesti	39	32
Calaras	26	47
Orhei	39	74
Ungheni	134	81

This list of potential investment targets may be extended to also include Rezina, Criuleni and Soroca, all in critical need of new treatment facilities, and Chisinau where sludge processing facilities require modernization.

Energy costs (Indicators 30.01-30.04)

Electricity consumption and costs are a major factor affecting the total costs of utilities.

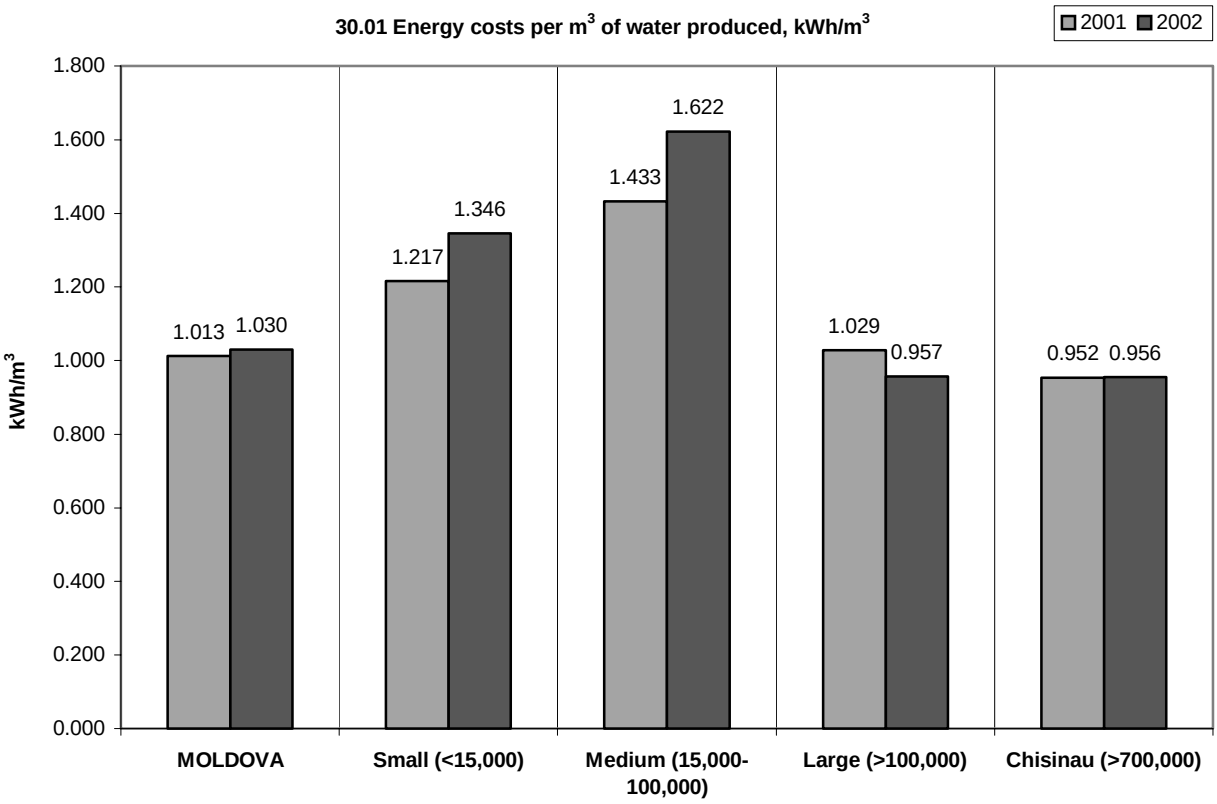
In 2002, the share of electricity in total utility costs and total material inputs stood at 25.1% and 60%, respectively.

The proportion of electricity costs has been declining from the peak 44% in 2000 yet not because of improved energy efficiency of operations but rather due to lower consumption resulting from a scaledown in water supply, wastewater collection and treatment, reduced uninterrupted daily service due to power cutoffs, and growth in other production costs components, such as taxes, amortization, payroll etc.

As electricity consumption is one of the largest components of production costs, it should be considered in conjunction with Indicators 30.01-30.04 characterizing electricity usage per cubic meter of produced water and collected and processed wastewater. This allows a more precise analysis of electricity usage to facilitate the reduction of energy costs through modernization of pumping stations and implementation of energy-saving measures.

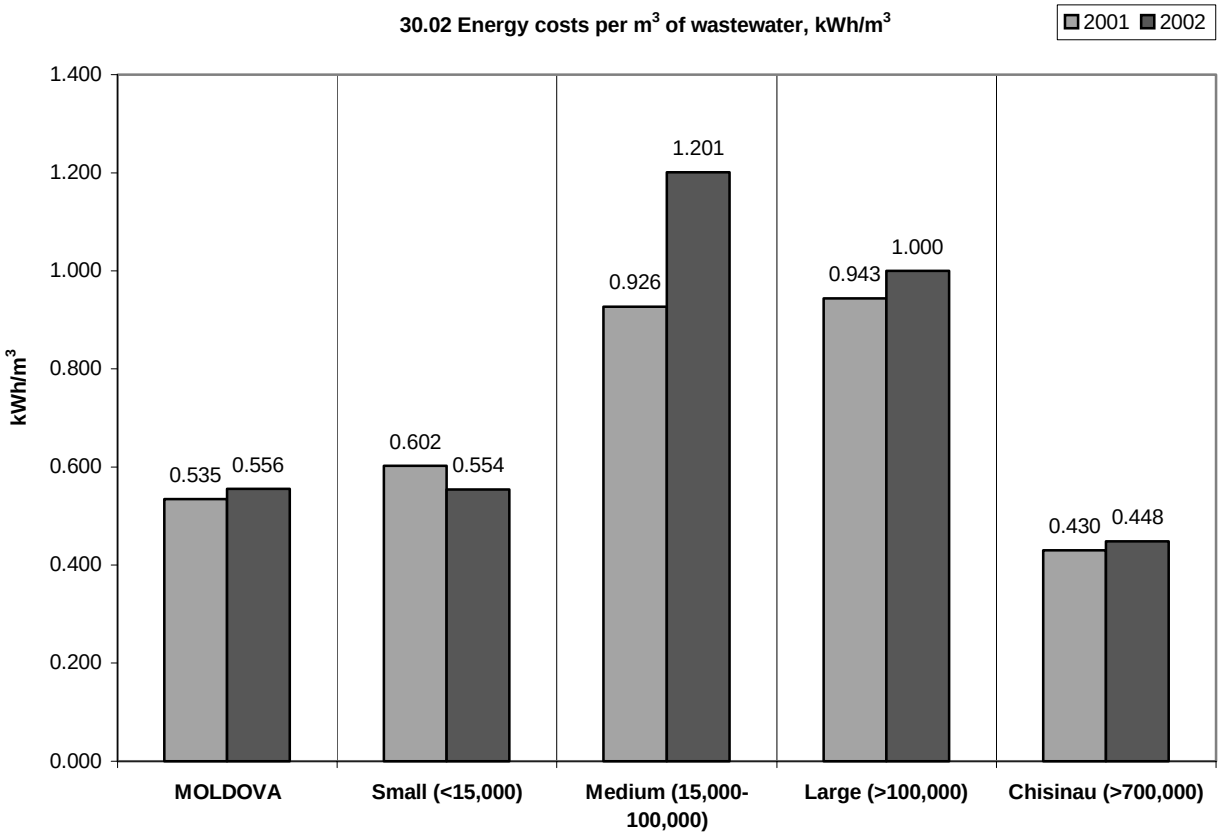
Indicator 30.01 illustrates electricity consumption per cubic meter of potable water produced and delivered to consumers (kWh/m^3).

Average country-wide electricity consumption per cubic meter of produced water over the analyzed period increased from 1.013 kWh to 1.03 kWh due to continued use of outdated and inefficient power equipment. This is especially apparent in small and medium towns, where Indicator 30.01 grew from 1.217 to 1.346 kWh/m^3 and from 1.433 to 1.622 kWh/m^3, respectively. The situation in these towns is further aggravated by the absence of funds and qualified staff for quality repairs of power equipment.



The decrease in electricity consumption in Balti from 1.029 kWh to 0.957 kWh does not testify to more efficient energy usage, but is explained by increased purchases of water from the Soroca-Balti water main, which requires much lower electricity inputs compared to well water. Water sourced from Soroca-Balti in 2002 totaled 63% of all water deliveries, compared to a mere 6% in 2001.

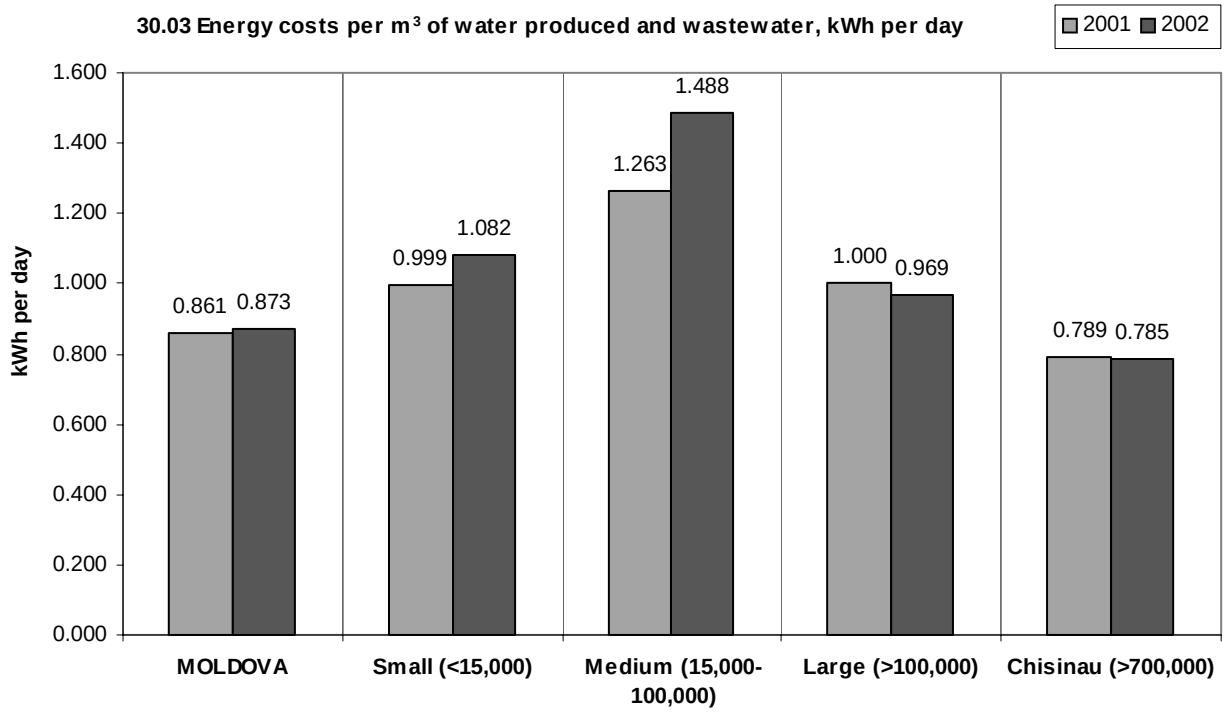
Indicator 30.02 characterizes energy costs per cubic meter of collected and processed wastewater (in kWh/m^3).



The energy costs of wastewater pumping and treatment have also increased over the analyzed period. The average value of Indicator 30.02 increased from 0.535 kWh to 0.556 kWh. This increase can be attributed to the use of low-performance power equipment and growing energy costs of sewage aeration owing to higher pollutant concentrations in both industrial and household wastewater due to reduced water consumption.

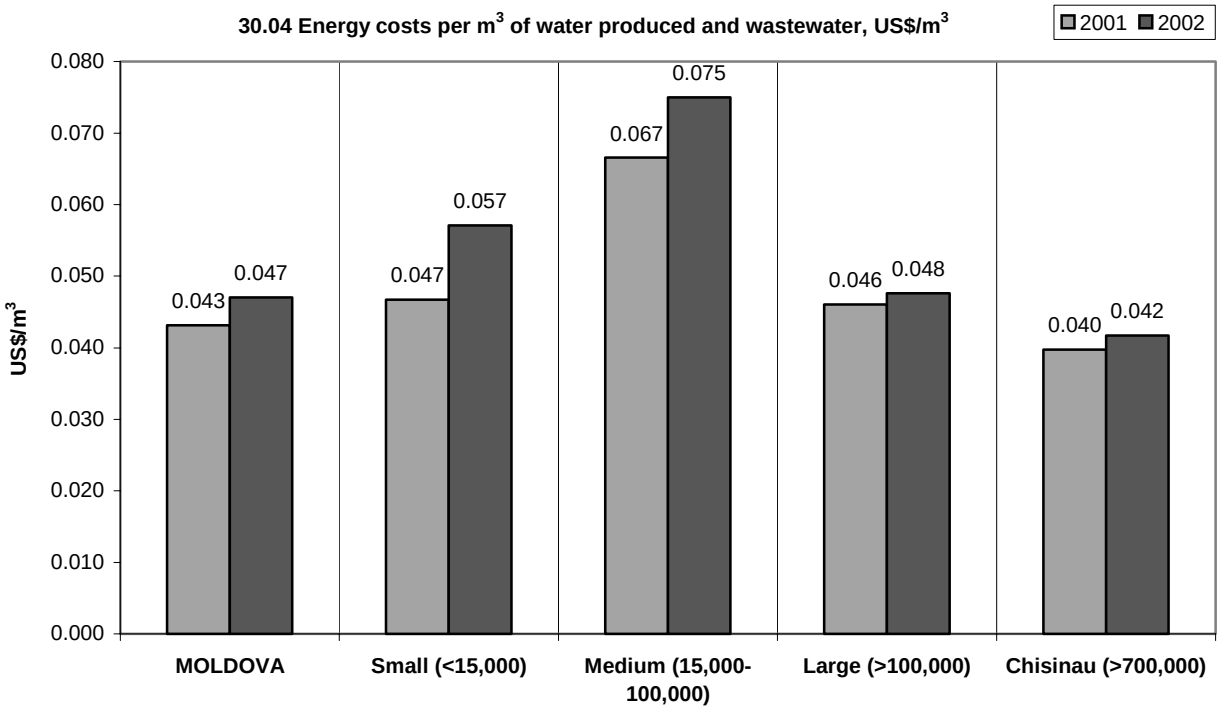
Lower energy consumption in wastewater pumping and treatment in small cities is explained by declining sewerage service quality, frequent disconnection of lift stations, and discontinuation of biological treatment at sewage facilities in some communities.

Indicator 30.03 shows total electricity usage per cubic meter of potable water produced and cubic meter of



collected and processed wastewater.
This indicator also demonstrated further growth in 2002 (1.3% average, 8.3% in small towns and 17.8% in medium towns), which confirms the need of power equipment modernization.

Indicator 30.04 characterizes energy costs per cubic meter of potable water produced and cubic meter of collected and processed wastewater (US$ per m^3).



The analysis of this indicator revealed that average total energy costs in monetary terms increased across the country from US$ 0.043 in 2001 to US$ 0.047 in 2002. Notably, because of differences in the water supply and wastewater collection and treatment systems used, as well as some other factors, the range of indicator values is very broad, from US$ 0.06 in Cojusna to US$ 0.254 in Calaras.

It is also worth mentioning that the monitoring of Indicators 30.01-30.03 is important for identifying changes in the efficiency of energy usage, both in the sector in general and at individual utilities. At the same time, these indicators do not enable inter-utility energy efficiency comparisons because of dissimilarities in water and sewerage systems and arrangements that may be different in terms of the number of pumping stations, intake type (surface or underground), station elevation, groundwater depth, wastewater treatment technology etc. Similarly, Indicator 30.04 can provide reliable information only for a specific utility, as following the privatization of power generation capacities in Moldova the cost of electricity varies from region to region (e.g. in 2002 price per 1 kWh was US$ 0.047 in the North and US$ 0.053 in the Southern and Central Moldova).

Water and sewerage utilities' financial performance indicators

F. Costs and staffing

Unit operational cost (Indicators 11.1-11.2)

Indicator 11.1 is defined as the ratio of operational expenses to total annual water billed (per m^3).

Indicator 11.2 is defined as the ratio of operational expenses to total annual water produced (per m^3).

This indicator is an important measure characterizing all aspects of a utility's operations and is heavily affected by the nature of the sector and the specifics of the processes involved. It is obvious that unit costs of different water operators will be contingent on a multitude of factors, such as the available water sources, the water supply technology used, the degree of water treatment, utility capacity, etc.

Smaller utilities have a less even consumption schedule and require a relatively larger reserve capacity.

Large and medium-sized utilities are able to ensure rational use of production capacity and personnel.

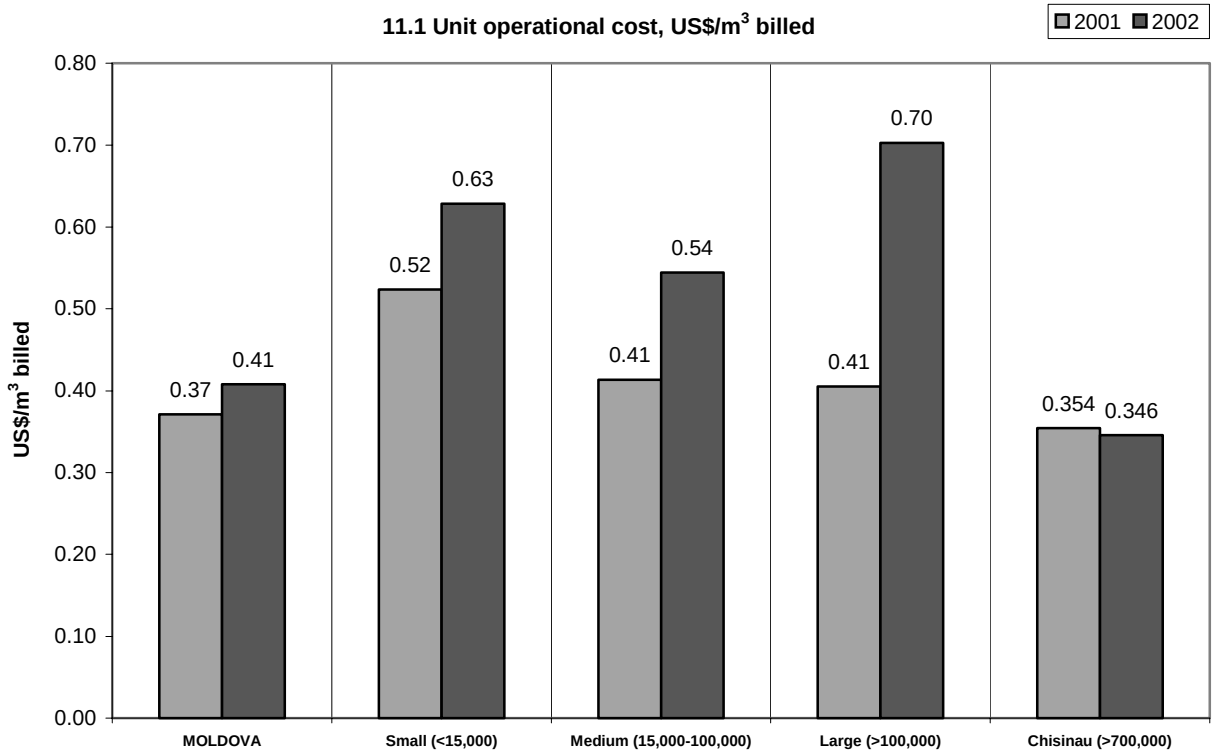
In view of the above, unit costs at large utilities will be lower than those of small operators.

Average country-wide unit operational costs per billed services increased in 2001-2002 from US$ 0.37 to US$ 0.41 per m^3. The unit costs of annual water produced have also increased, from US$ 0.22 to US$ 0.24 per m^3.

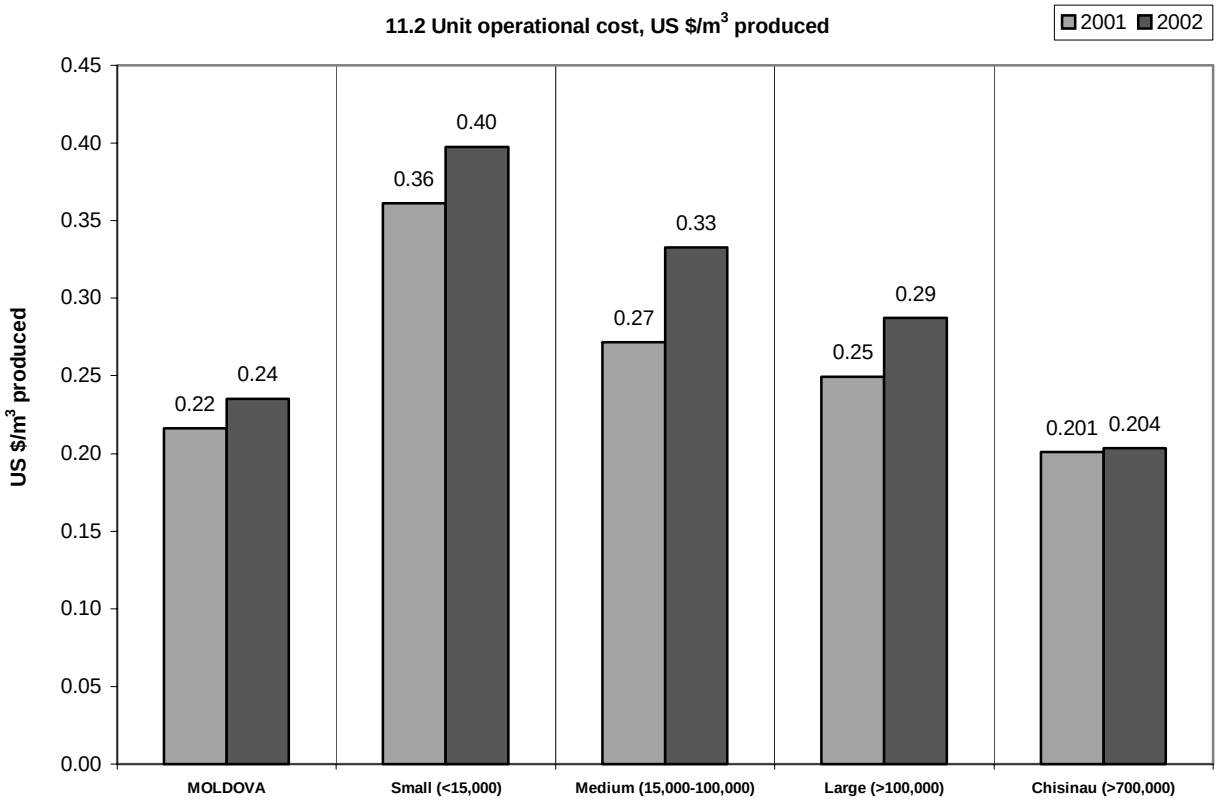
The highest unit costs were reported by small towns at US$ 0.63 per m^3 against US$ 0.52 in 2001. In medium towns, unit costs also increased, going up from US$ 0.41 to US$ 0.54.

A significant growth in Indicator 11.1 was observed in Balti (from US$ 0.41 to US$ 0.70). Indicator 11.2 for Balti also increased, albeit not as dramatically (from US$ 0.25 to US$ 0.29), and only in Chisinau unit costs declined from US$ 0.354 to US$ 0.346.

30% of utilities exhibited growth in Indicator 11.1 compared to 2001, by a factor of 1.5-3 times. The value of Indicator 11.1 for 2002 varied from US$ 0.18 to US$ 2.42 per m^3.



Unit operational costs per annual water produced did not exceed US$ 0.70 per m^3 at most utilities, with Indicator 11.2 ranging from US$ 0.15 to US$ 1.04 per m^3.



A small number of utilities (a total of 10 operators) reported lower unit costs. This however does not imply improved efficiency of operations, but is rather the result of the absence of 'live cash'.

Given that tariff policy has been identified as a key reason for the poor financial condition of utilities, it is very useful to consider such an indicator as the unit operational cost of water and sewerage services in comparison with Indicator 18.1, which characterizes the average water and sewerage tariff (see Table *F 1*).

Table F 1

Town	Ind. 18.1 US$/m^3	Ind. 11.1 US$/m^3	Town	Ind. 18.1 US$/m^3	Ind. 11.1 US$/m^3
MOLDOVA total	0.44	0.41			
Balti	0.64	0.70			
Chisinau Municipality	0.40	0.35			
Small towns	0.52	0.63	**Medium towns**	0.49	0.54
Floreni	0.45	1.0	Taraclia	0.52	0.65
Chainari	0.34	0.73	Florești	0.52	0.44
Lipcani	0.56	1.12	Vulcanesti	0.61	0.86
Cantemir	0.58	1.14	Nisporeni	1.26	1.07
Cojusna	-	-	Calaras	0.98	1.26
Otaci	0.14	0.18	Falesti	0.21	0.35
Stauceni	0.34	0.51	Hincesti	1.04	1.0
Cricova	0.34	0.32	Straseni	1.35	2.42
Soldonesti	0.41	0.63	Chauseni	0.48	0.78
Telenesti	0.88	1.48	Drochia	0.90	1.30
Criuleni	0.46	0.57	Ceadir-lunga	0.62	0.71
Stefan voda	1.32	1.59	Comrat	0.43	0.28
Ocnita	0.36	0.42	Edineti	0.69	1.16
Briceni	0.69	0.78	Orhei	0.54	0.50
Donduseni	0.67	0.86	Soroca	0.50	0.52
Leova	0.53	0.57	Ungheni	0.27	0.25
Anenii Noi	0.58	0.66	Cahul	0.34	0.29
Glodeni	1.14	1.41			
Basarabeasca	0.66	0.58			
Rezina	0.48	0.61			
Riscani	0.66	0.75			
Singerei	0.21	0.23			

The table above shows that 76% of utilities exhibit an apparent trend of average tariffs being lower than average production costs (Indicator 18.1 minus Indicator 11.1).

As such state of things is incompatible with potential foreign investor requirements, it appears advisable to first undertake efforts to improve the local financial environment, creating conditions which would ensure that Indicator 18.1 is higher than Indicator 11.1.

It is absolutely clear that tariffs must be adjusted in line with changes in objective costs. Otherwise, fixed tariffs and growing costs will make water and sewerage services a loss-making business, with only a handful of utilities being able to preserve any profit margin.

However, in practice tariffs are revised with a significant time lag due to various factors, the crucial one being imperfect legislation.

Staffing (Indicators 12.1, 12.2, 12.3 and 12.4)

Indicator 12.1. Staff per thousand water connections.

Indicator 12.2. Staff per thousand water and sewerage connections.

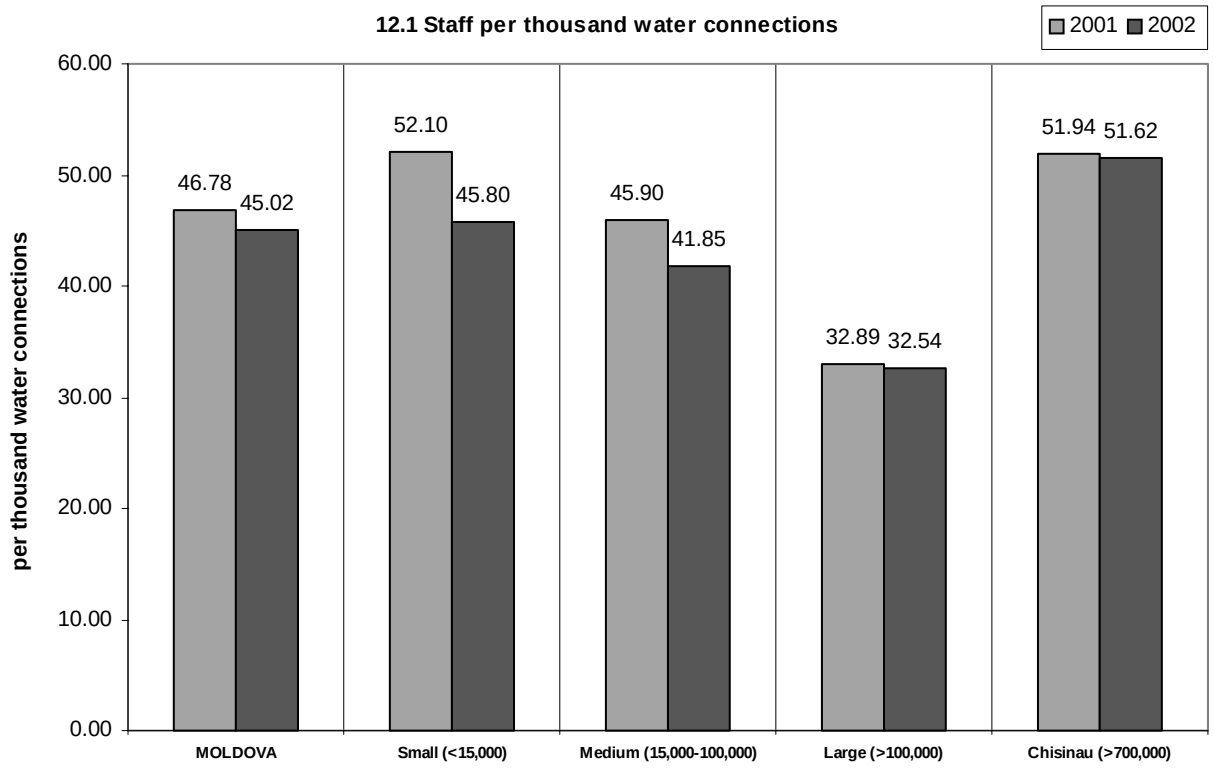
Indicator 12.3. Staff per thousand water population.

Indicator 12.4. Staff per thousand water and sewerage population.

As the number of staff changed very little compared to 2001, its impact on these indicators is insignificant. This is especially clear from a comparison of indicators characterizing staffing per thousand water and sewerage connections (Indicator 12.2) and per thousand water and sewerage service populations (Indicator 12.4). Given certain difficulties as regards the number of connections, Indicator 12.4 appears to be a more reliable measure.

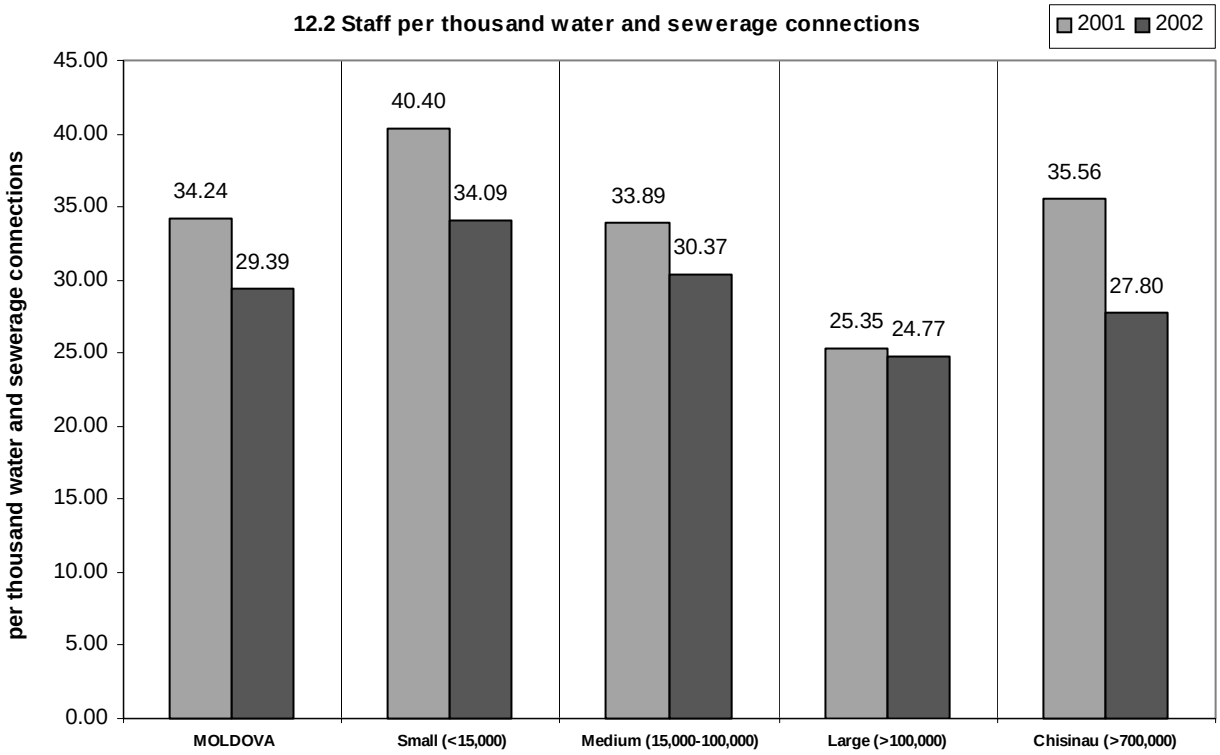
The average value of Indicators 12.3 and 12.4 across the country slightly declined, from 5.08 to 4.64 persons and from 2.91 to 2.64 persons, respectively. Staffing per thousand water population is the highest in small and medium towns at 8.12 and 7.39 persons, respectively.

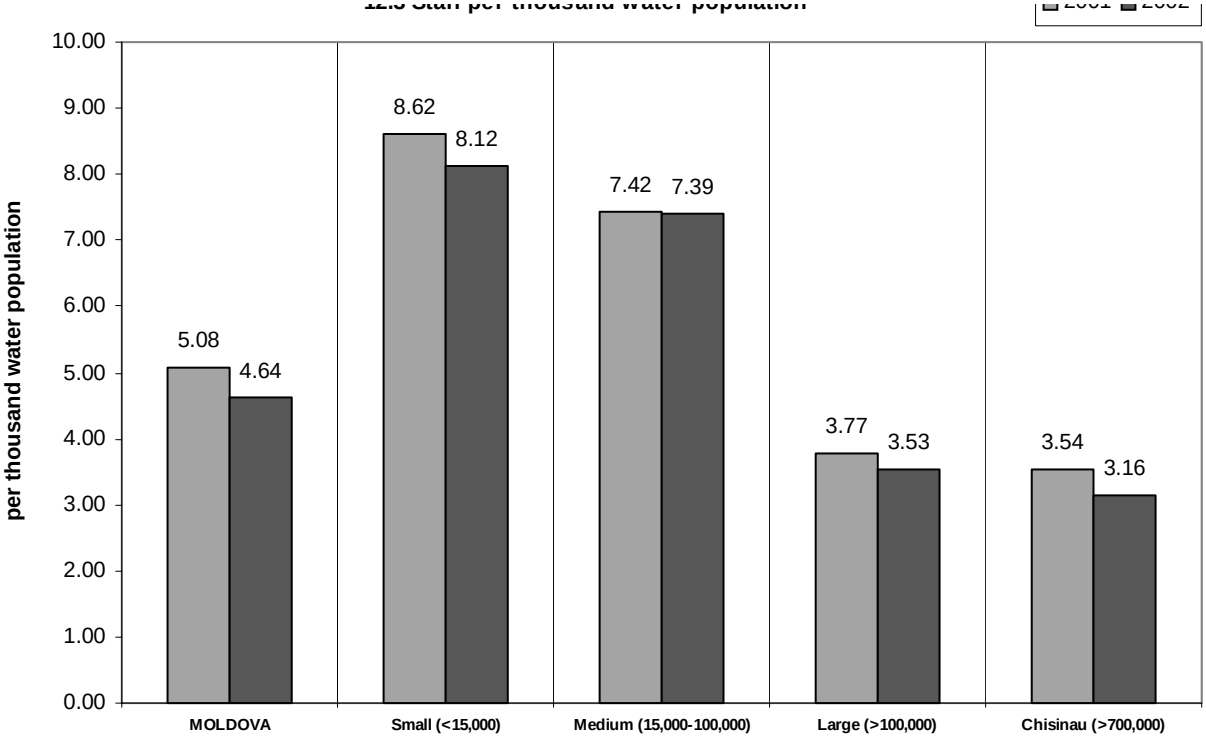
Average indicators 12.1 and 12.2 across the country and separately for town groups also exhibit a steady downward trend.

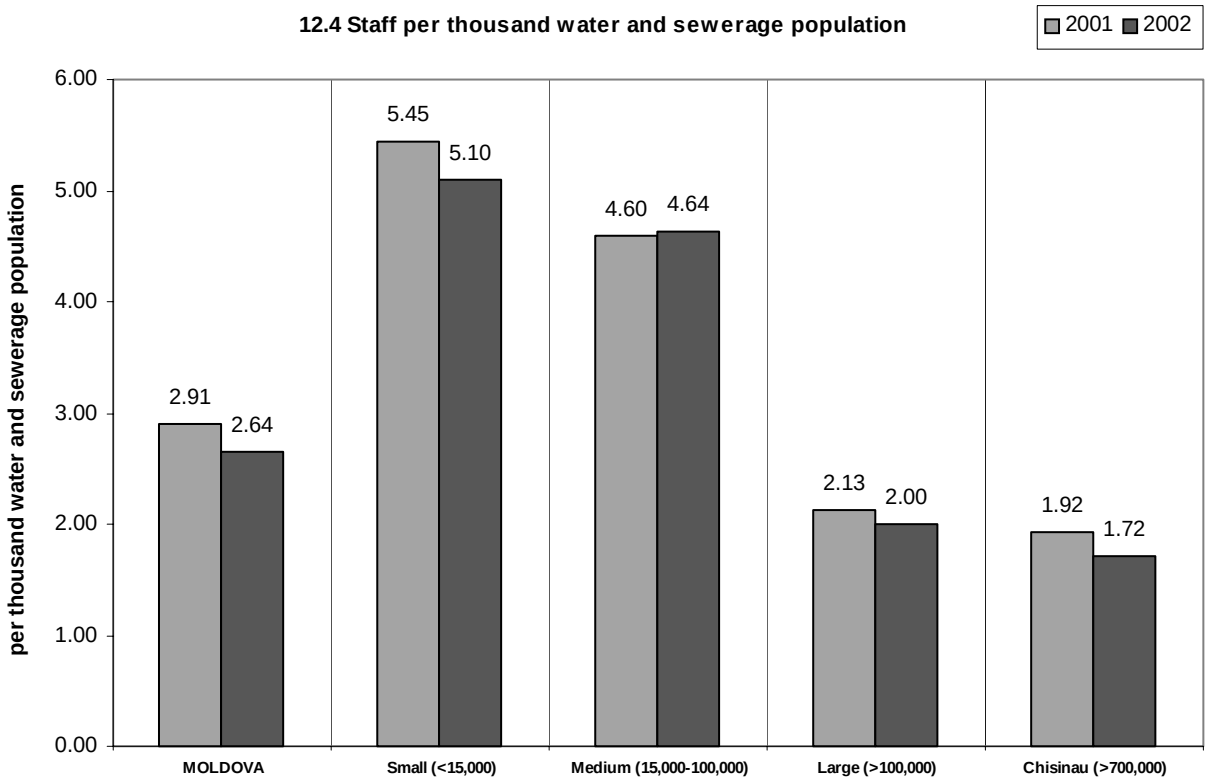


Average country-wide Indicator 12.1 declined from 46.79 to 45.02 persons, and Indicator 12.2 - from 34.24 to 29.39 persons.

Staffing per thousand water connections is also the highest in small and medium towns at 45.80 and 41.86 persons, respectively. This indicates a certain overmanning and inefficient use of personnel, as well as low level of automation.




per thousand water population
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
5.08
4.64
8.62
8.12
7.42
7.39
3.77
3.53
3.54
3.16
MOLDOVA
Small (<15,000)
Medium (15,000-100,000)
Large (>100,000)
Chisinau (>700,000)

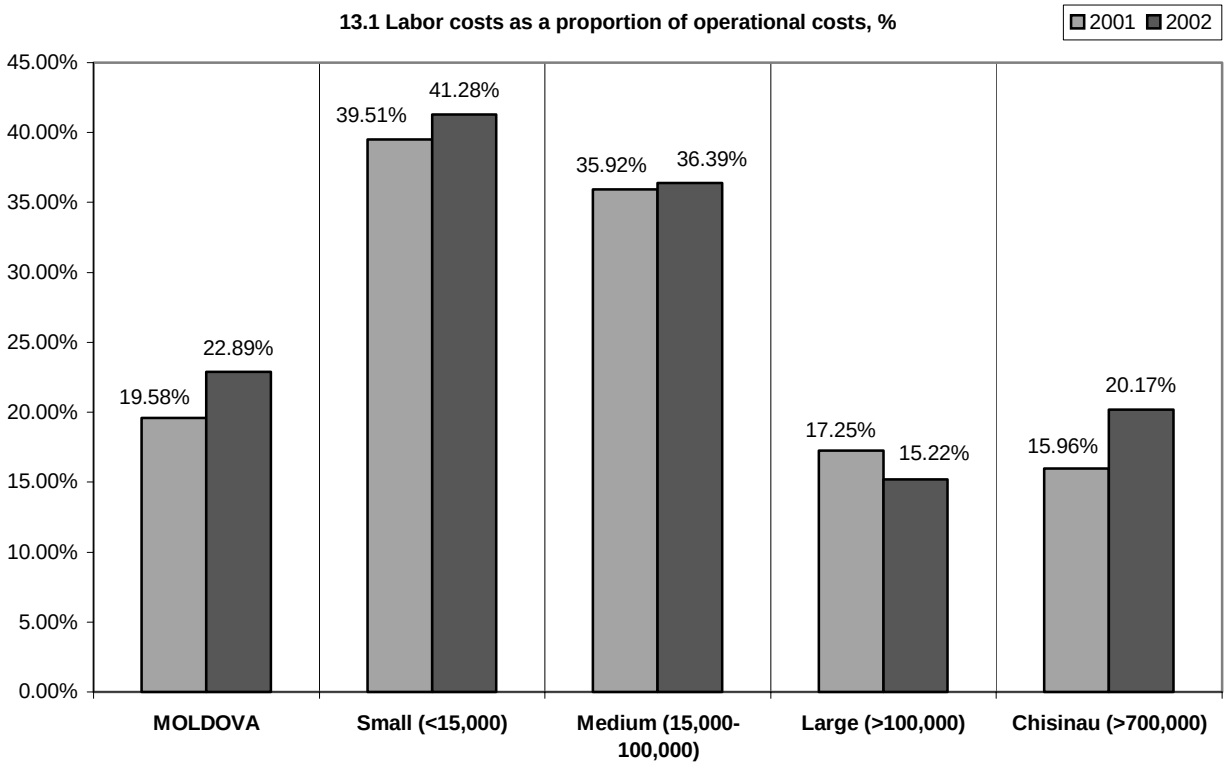

12.4 Staff per thousand water and sewerage population
2001
2002
per thousand water and sewerage population
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2.91
2.64
5.45
5.10
4.60
4.64
2.13
2.00
1.92
1.72
MOLDOVA
Small (<15,000)
Medium (15,000-100,000)
Large (>100,000)
Chisinau (>700,000)

Labor costs as a proportion of operational costs (Indicator 13.1)

Indicator 13.1 (Labor costs as a proportion of operational costs) exhibits positive dynamics over the analyzed period, with a country-wide increase from 19.58 to 22.89%.

The maximum proportion of labor costs is observed among small towns at 41.28%, an increase of 1.7% against 2001, i.e. at small-town utilities labor costs became the major component of production costs.

In medium towns and in Chisinau, the increase totaled 0.5% and 4.2%, respectively. In Balti, Indicator 13.1 declined from 17.25 to 15.22% due to reduced personnel and wages.



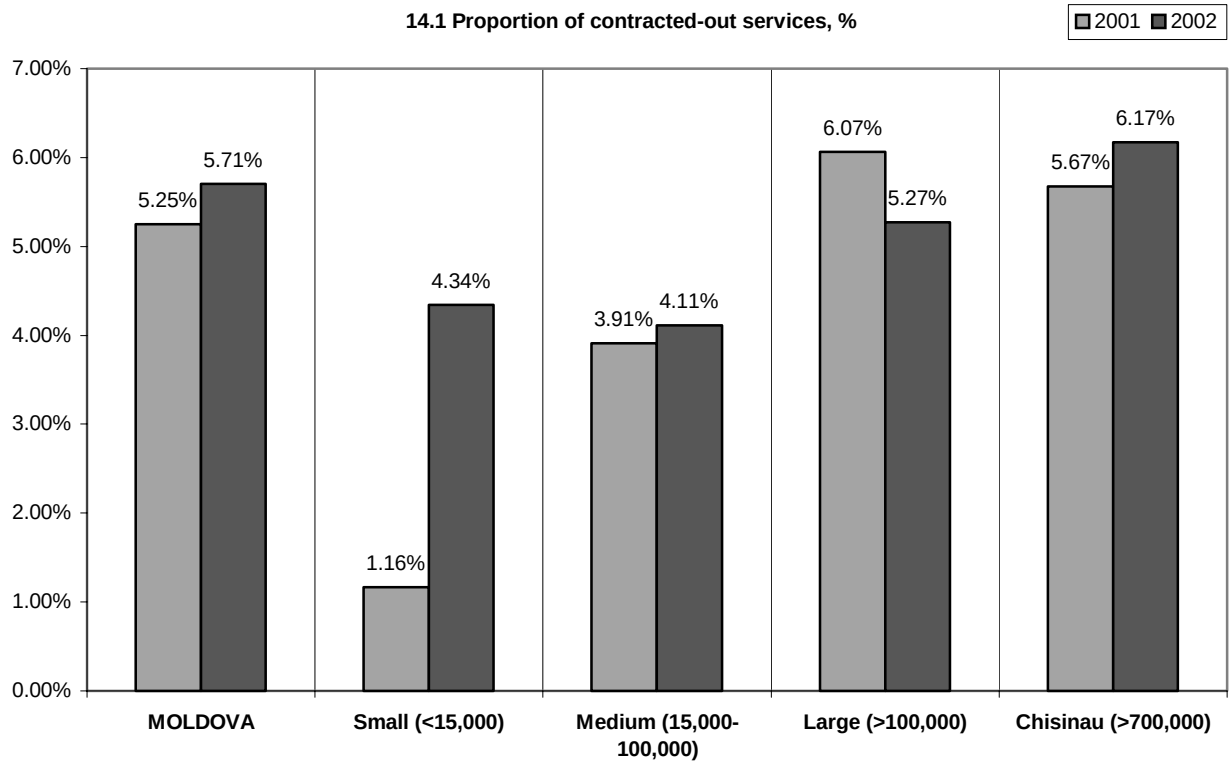
Even though the percentage of labor costs (including social insurance) in some towns is very high (e.g. 76.50% in Nisporeni; 66.55% in Chainari; 58% in Floreşti), average salaries are not (US$ 31.2, US$ 36.1 and US$ 33.21, respectively).

Proportion of contracted-out services (Indicator 14.1)

Indicator 14.1 across the sector exhibits uneven dynamics over the years.

For example, in 1996 the average proportion across Moldova stood at 8%, changing to 4% in 1998 and 1999, 3% in 2000, 5% in 2001 and 6% in 2002. This indicates that utilities prefer to make repairs using own resources.

In 2002, however, the value of this indicator for small and medium towns was lower than for large towns and Chisinau.



Only 20% of utilities reported contracted-out services above the national average.

H. Billings and collections

Average tariff (Indicators 18.1-18.3)

Indicator 18.1 Annual utility revenue per cubic meter of water billed.

Indicator 18.2. Annual revenue per connection.

Indicator 18.3. Annual revenue per household.

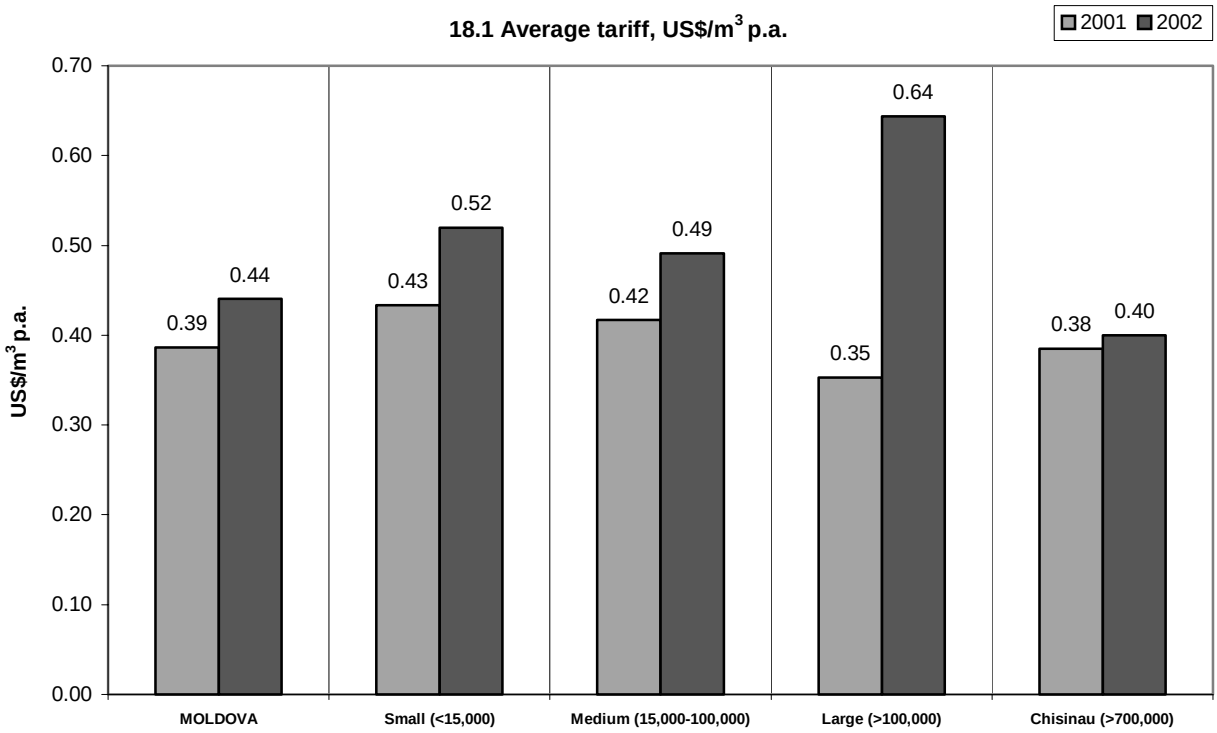
To ensure sustainability of water and sewerage utilities, services should be provided for a fee, based on the principle of cost recovery.

At present, many utilities do not comply with this principle, and tariffs fail to cover operational costs and expenses.

The level of tariffs may be affected by such factors as the organizational structure of a utility, its production program, changes in the scope of services provided, process technology and service quality, amortization policy, taxes, etc. Changes in some of these factors are associated with additional production-related investments and are usually long-term in nature.

In addition, to a certain degree the tariff-setting process is also adversely affected by subjective judgments when new charges are approved, as well as by the length of the approval process.

Overall, in 2002 all utility groups reported an increase in average tariffs per 1 m^3 of water and wastewater, from US$ 0.39 to US$ 0.44 across the country; from US$ 0.43 to US$ 0.52 in small towns; from US$ 0.42 to US$ 0.49 among medium towns, and from US$ 0.35 to US$ 0.64 for m^3 in Balti.

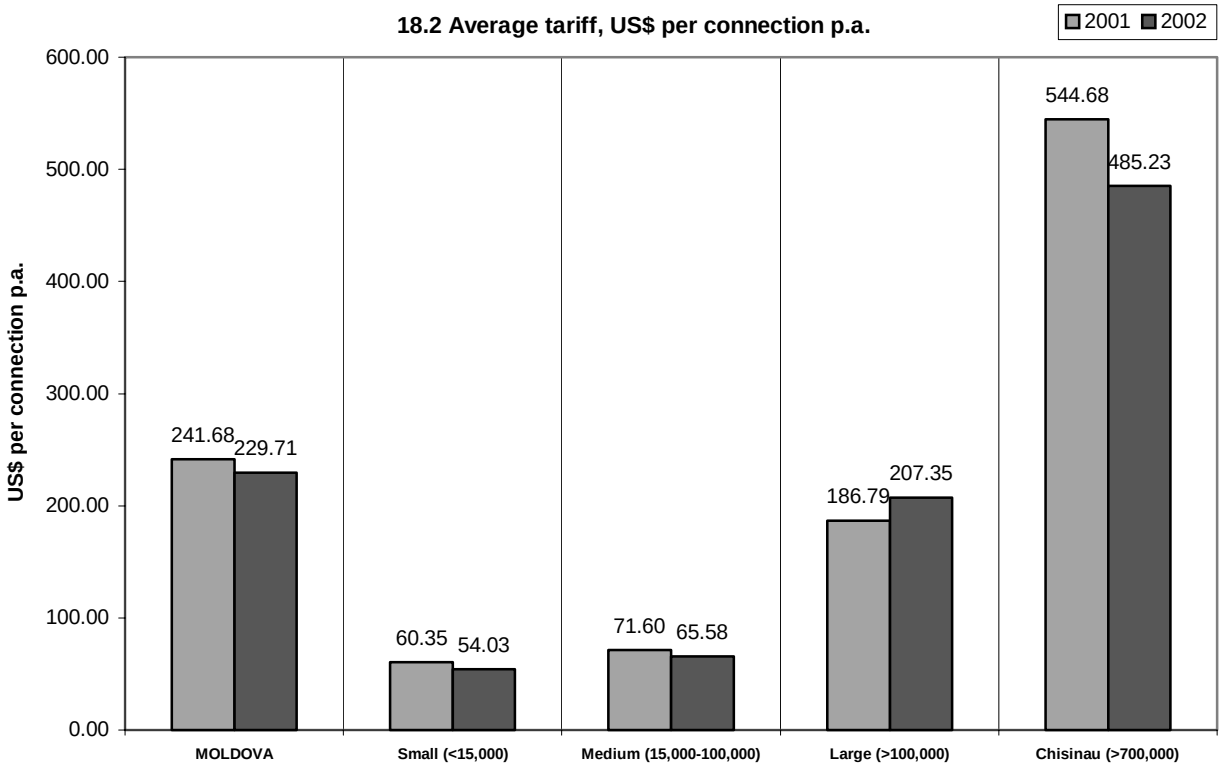


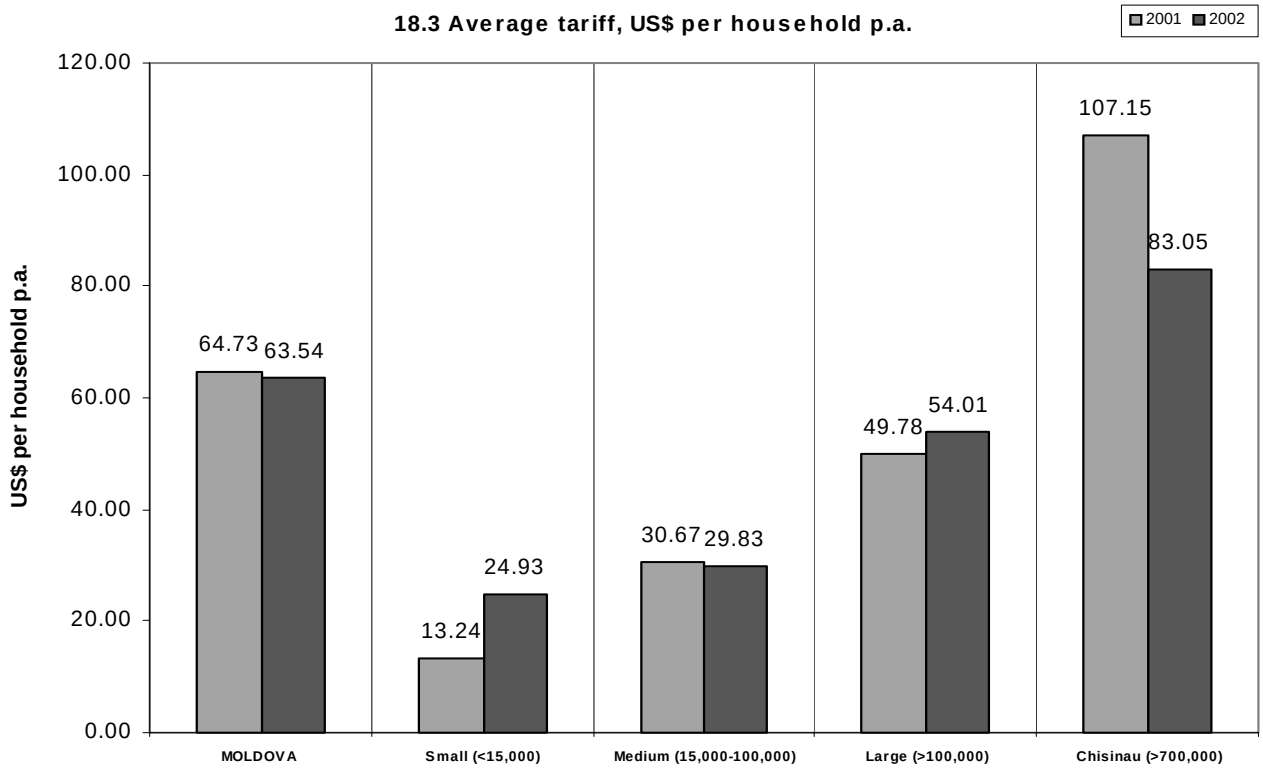
25% of utilities reported relatively large tariff increases in 2002, by a factor of 1.5-2. Average tariffs across the sector vary from US$ 0.15 to US$ 1.35 per m^3.

To obtain reliable information on payments for water and sewerage services, two indicators are used that define the average tariff per connection and household per annum.

These indicators were calculated for Moldova in general and separately for each utility group.

Indicator 18.2 in 2002 on average declined by US$ 11.97 per connection p.a. The minimum and the maximum values were reported by small utilities and Chisinau at US$ 54.03 and US$ 485.23, respectively.





Indicator 18.3 is defined as the average tariff per household p.a. Moldova average for 2002 totaled US$ 63.54.

The average country-wide indicator value reduced in 2002 by US$ 1.20 per household p.a. due to minor income growth (100.04%) and faster growth in the number of households (105.3%).

Water charges as a proportion of per capita income (Indicator 19.1)

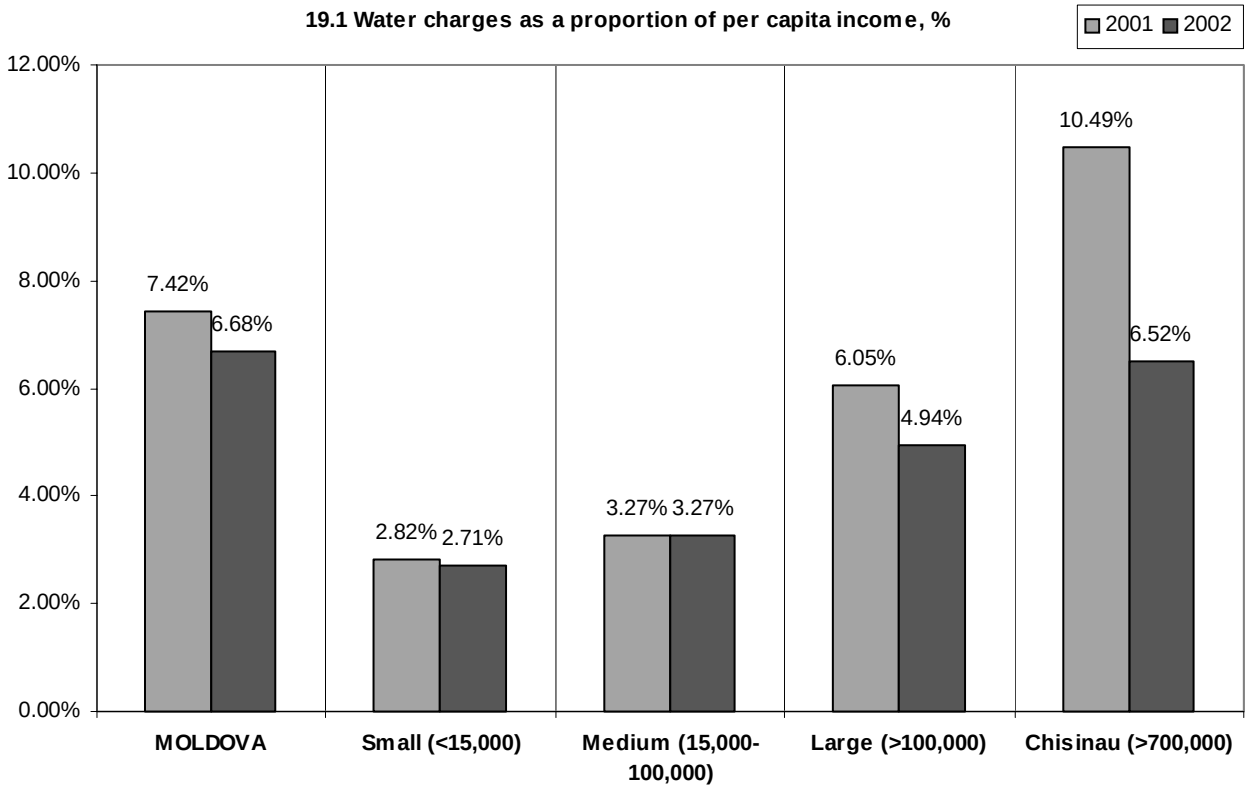
Indicator 19.1 characterizes the ratio of water charges to per capita income of consumers.

As water and sewerage utilities lack information on per capita income in their respective service areas, calculations are based on average national GDP per capita according to Department of Statistics' data for 2002 (US$ 455 p.a.).

The derived indicator provides only a very general picture of residential consumers' paying capacity.

The main trends characteristic of Indicator 19.1 include the following:

- minor indicator values (0.5%-3.7%) for the vast majority of utilities; higher values only in Chisinau and Balti (6.52% and 4.94%, respectively);
- declining proportion of water charges in per capita income due to faster growth of personal income compared to increases in water service charges.



Indicator 19.1 across the country totaled 6.68%, a drop of 0.74% against 2001.

In Balti and Chisinau, the proportion declined in 2002 by 1.11% and 3.97%, respectively, indicating that personal income growth outpaced tariff increases (in Balti, tariffs had been approved in November 2002, while Chisinau uses tariffs dating back to 2001).

Fixed monthly charge (Indicators 20.1-20.2)
Connection charge (Indicators 22.1-22.4)

Indicators 20.1-20.2. Fixed annual connection charge and its proportion in annual service revenue.

Indicator 22.1 - 22.4. Water (sewerage) connection charge as a proportion of per capita income (in percent). As none of the utilities provided information on charges per connection (all utilities use single-rate tariffs, with no segregation of connection charges), no calculations were performed for Indicators 20.1-20.2 and 22.1-22.4.

Ratio of industrial to residential charges, % (Indicator 21.1)

Moldova continues a program to equalize tariffs for residential consumers and business entities. In accordance with the Tariff Approval Methodology for Water and Sewerage Services, a single tariff for all customer groups is to be introduced as of January 1, 2004.

However, before the single tariff is enacted, a whole range of regulations must be aligned accordingly. At present, six draft laws and two Cabinet decrees with proposed amendments are pending consideration and approval.

In 2002 water and sewerage utilities continued the practice of cross-subsidizing residential users at the expense of industrial consumers (see Table *H 1*).

Table H 1

Item	Average tariff, US$/m^3	Ratio of industrial to residential tariff
Water		
Total	0.31	
including:		
- residential consumers	0.16	0.62:0.16=3.87 times
- business entities	0.62	
Sewerage		
Total	0.13	
including:		
- residential consumers	0.058	0.286:0.058=4.93 times
- business entities	0.286	

On average, proceeds from industrial customers in Moldova exceed residential water and sewerage revenues by 4.06 times.

The ratio of industrial to residential charges in small towns increased from 5.29 to 6.66 and remains rather high in medium towns, albeit with a slight drop from 7.46 to 6.31.

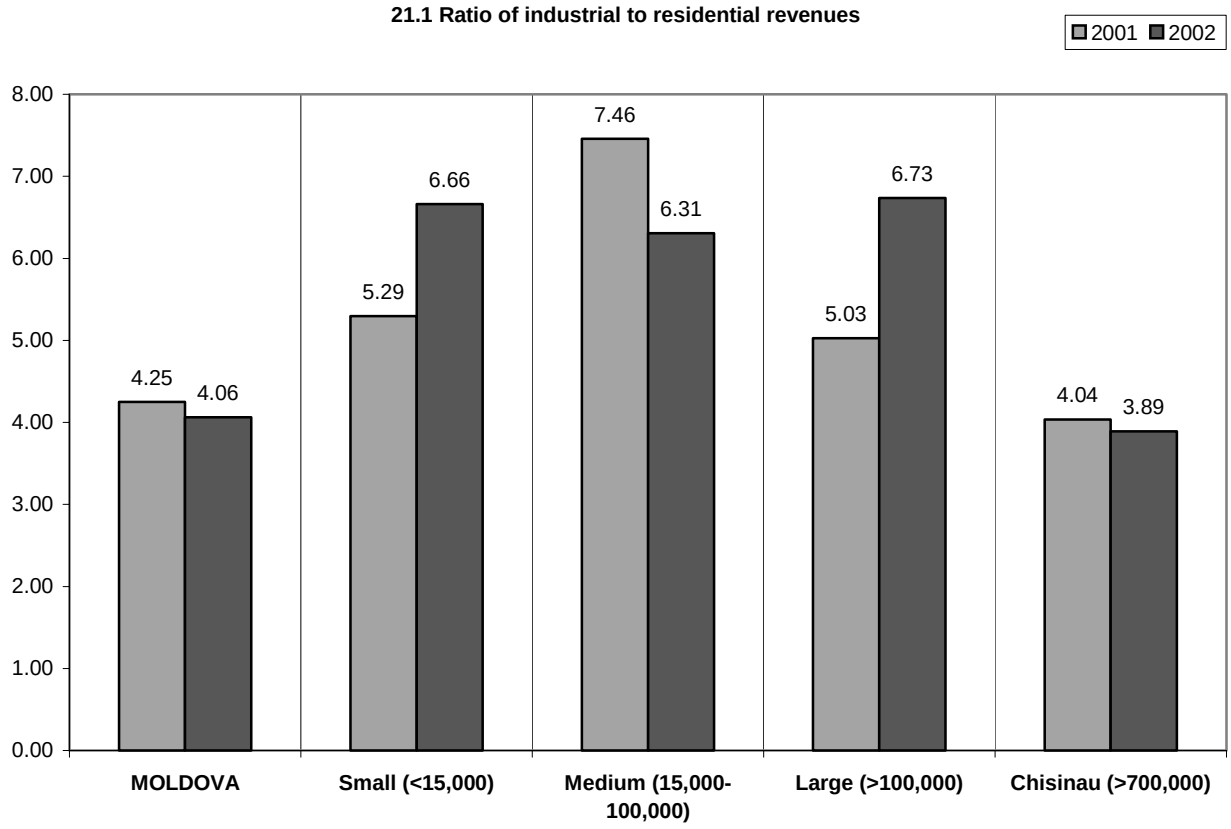


Table *H2* presents the breakdown of water and sewerage revenues per residential and industrial consumers for several towns.

Table H 2

Town	Water		Sewerage	
	residential revenues (%)	revenues from business entities	residential revenues (%)	revenues from business entities
Chisinau	30.2	69.8	32.2	67.8
Balti	43.0	57	16.7	83.3
Cahul	48.7	51.3	30.8	69.2
Orhei	54.8	45.2	10.5	89.5
Ceadir-lunga	59.2	40.8	9.9	90.1
Moldova average	**34.2**	**65.8**	**29.5**	**70.5**

At 30% of surveyed utilities, industrial revenues exceed residential proceeds by ten or more times. The minimum and the maximum values of Indicator 21.1 are 1.21 and 57.37.

Collection (Indicator 23.1)

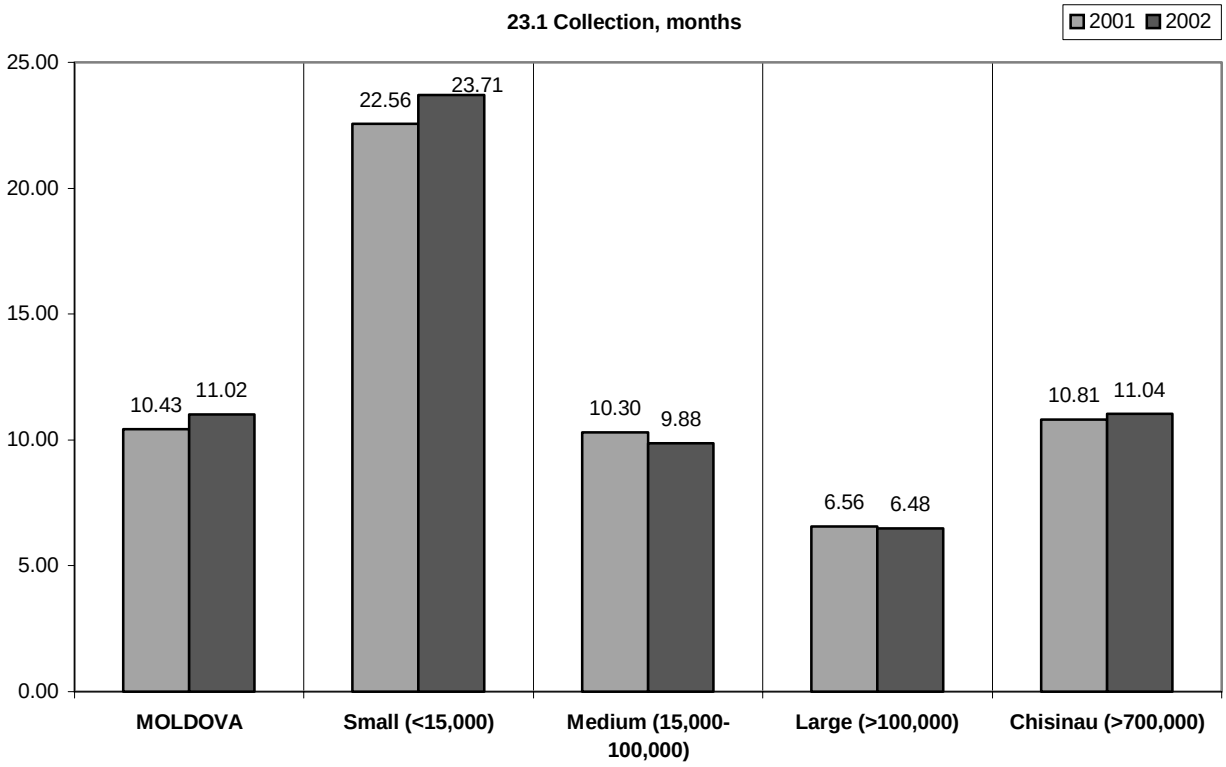
Billings and collection are two different things.

The effectiveness of the collections process is measured by the proportion of outstanding accounts receivable at year-end compared to total billings for the year. This indicator is expressed in month equivalents.

Over 2001-2002, this indicator exhibited an obvious increase in average outstanding accounts receivable across Moldova from 10.4 to 11.02 months.

Among small towns, the longest collection period exceeded average performance by 12.69 months. The maximum value of Indicator 23.1 was also registered within this group.

In medium towns, collection period reduced from 10.30 to 9.88 months, in Balti - from 6.56 to 6.48 months, and in Chisinau increased from 10.81 to 11.04 months.



The length of collection period is noticeably dependent on the size of community (6-11, 9.9 and 24 months in large, medium and small towns, respectively), which may indicate higher paying capacity in medium and large towns.

I. Financial performance indicators

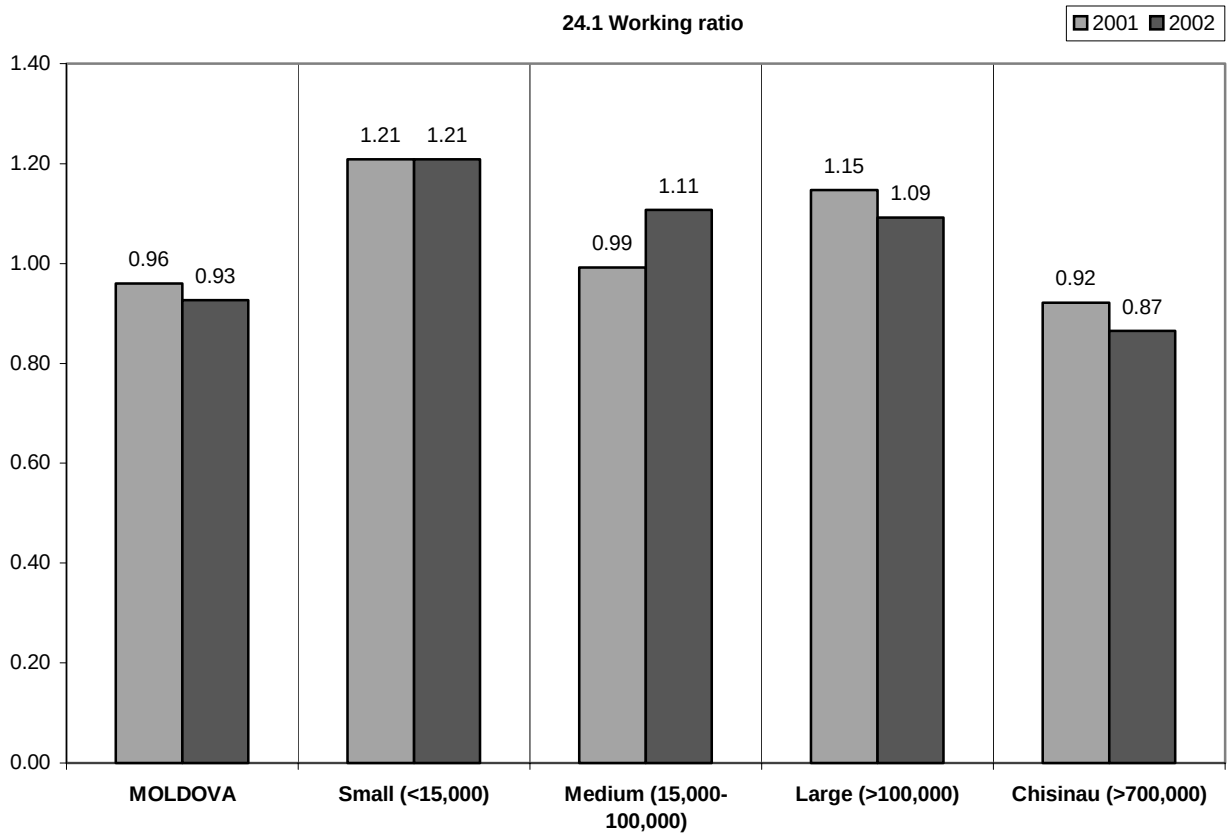
Working ratio (Indicator 24.1)

This key indicator shows the ratio of annual operational costs to billings.

This indicator is hardly a random choice, as it makes it possible to assess the ability of a company to settle its current liabilities and to see whether its revenues exceed costs.

The usual measures commonly used for comparing industrial enterprises (such as profitability and a range of financial ratios) do not factor in the specific operating environment of water and sewerage operators and are thus unsuitable for their analysis.

The average indicator value for Moldova is below 1 (0.93 in 2002), i.e. the sector remained generally profitable compared to 2001 and showed an even somewhat better performance. However, with the sole exception of Chisinau, all three groups reported Indicator 24.1 at above 1 (1.21, 1.11 and 1.09 in small towns, medium towns and Balti, respectively).



The number of utilities with operational costs in excess of total sales increased from 29 in 2001 to 31 in 2002 (Table I 1).

The number of utilities with costs exceeding revenues by a factor of 1.5 increased from two to eleven over the analyzed period.

If we abandon the World Bank methodology and additionally include in costs such components as amortization, loan interest and debt service and repayment, the losses will be much higher.

Over 80% of utilities reported negative results of operations in 2002, i.e. costs exceeded revenues.

The key adverse factors that affected operating results include further reduction in the scope of rendered services, changes in the customer mix and delays in the introduction of new tariffs given the appreciation of its main components, as well as problems with laws and their local application.

For comparison purposes, the table below presents Indicator 24.1 performance for 2001-2002 by town:

Table I 1

Town		Indicator 24.1	
		2001	2002
Chisinau		0.92	0.87
Balti		1.15	1.09
Small towns	Floreni	1.06	2.24
	Chainari	1.41	2.17
	Lipcani	1.37	2.01
	Cantemir	1.25	1.97
	Cojusna	1.48	1.31
	Otaci	0.96	1.34
	Stauceni	1.09	1.5
	Cricova	0.82	0.93
	Soldonesti	1.19	1.53
	Telenesti	1.58	1.68
	Criuleni	1.28	1.25
	Stefan voda	1.21	1.2
	Ocnita	1.37	1.16
	Briceni	0.87	1.13
	Donduseni	1.12	1.29
	Leova	1.08	1.07
	Anenii Noi	1.08	1.13
	Glodeni	1.98	1.24
	Basarabeasca	1.05	0.88
	Rezina	1.16	1.27
	Riscani	0.92	1.14
	Singerei	1.07	1.12
Medium towns	Taraclia	1.07	1.24
	Florești	0.77	0.85
	Vulcanesti	1.42	1.42
	Nisporeni	0.95	0.85
	Calaras	1.01	1.29
	Falesti	1.25	1.65
	Hincesti	0.86	0.96
	Straseni	1.41	1.79
	Chauseni	1.13	1.62
	Drochia	1.09	1.45
	Ceadir-lunga	1.33	1.15
	Comrat	1.13	0.65
	Edineti	0.84	1.69
	Orhei	0.88	0.93
	Soroca	1.34	1.04
	Ungheni	0.83	0.93
	Cahul	0.98	0.85

Debt service ratio (Indicator 25.1)

Indicator 25.1, calculated as a percentage, shows the ratio of debt service costs to annual billings, making it possible to identify the proportion of debt service in overall costs.

Under the World Bank methodology, debt service is not included in costs, while in accordance with Moldova's national accounting standards (NAS 3), it is a component of operating expenses.

In 2002, debt service costs were reported only by Chisinau at 25%. Other utilities had no loans and borrowings.

J. Capital investment

Investments (Indicators 26.1 and 26.2)

The volume of investments varies from year to year, and Indicator 26.1 reflects these changes.

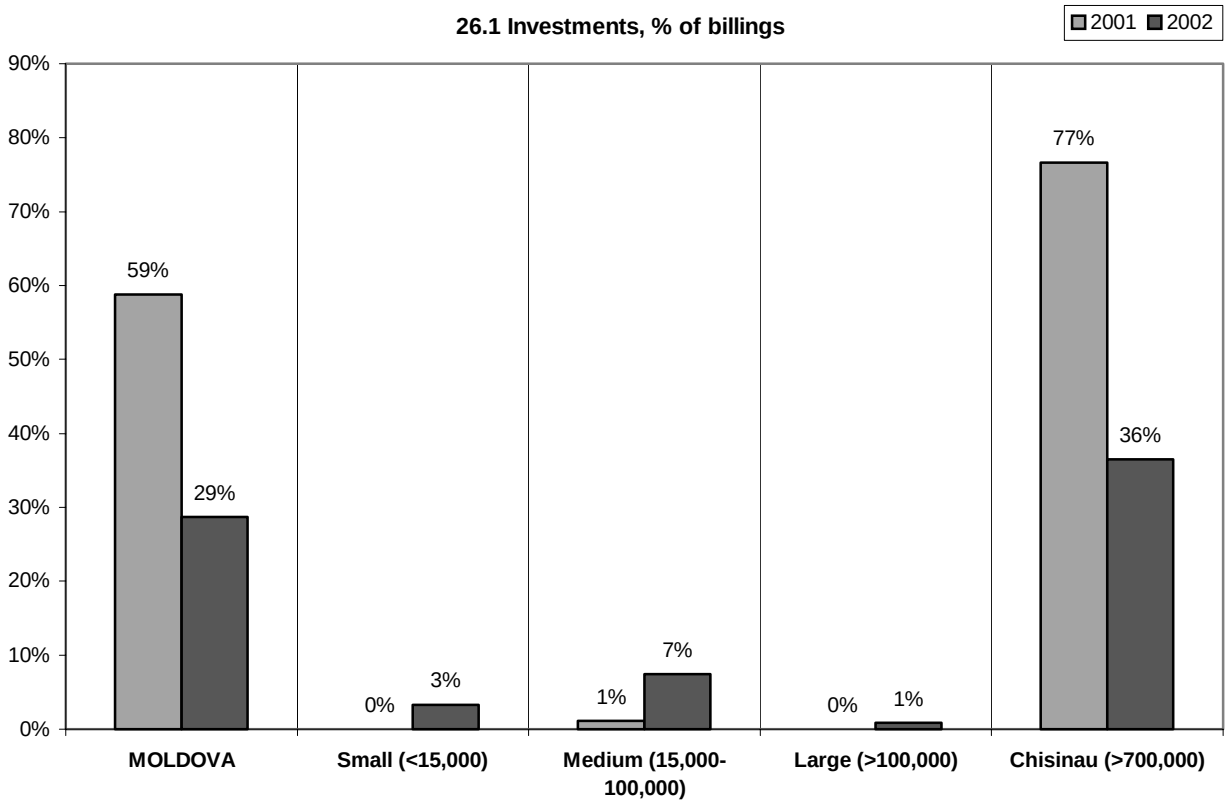
In 2002 average total investments across Moldova as a percentage of total billings (in US Dollars per capita) declined from 59 to 29%.

Investments in the water sector in 2002 totaled US$ 7.8 million and included budget allocations (20%), a grant (76%) and own investments by utilities (a modest 4%). The distribution of investments was as follows: small towns - US$ 35,500, medium towns - US$ 226,100, Balti - US$ 22,100, Chisinau - US$ 7,537,000.

The existing Tariff Approval Methodology for Water and Sewerage Services does not stipulate the formation of investment funds, although the level of investment provides insight as to the situation with fixed asset renewals and, indirectly, the ability to operate in a sustainable manner in the current environment.

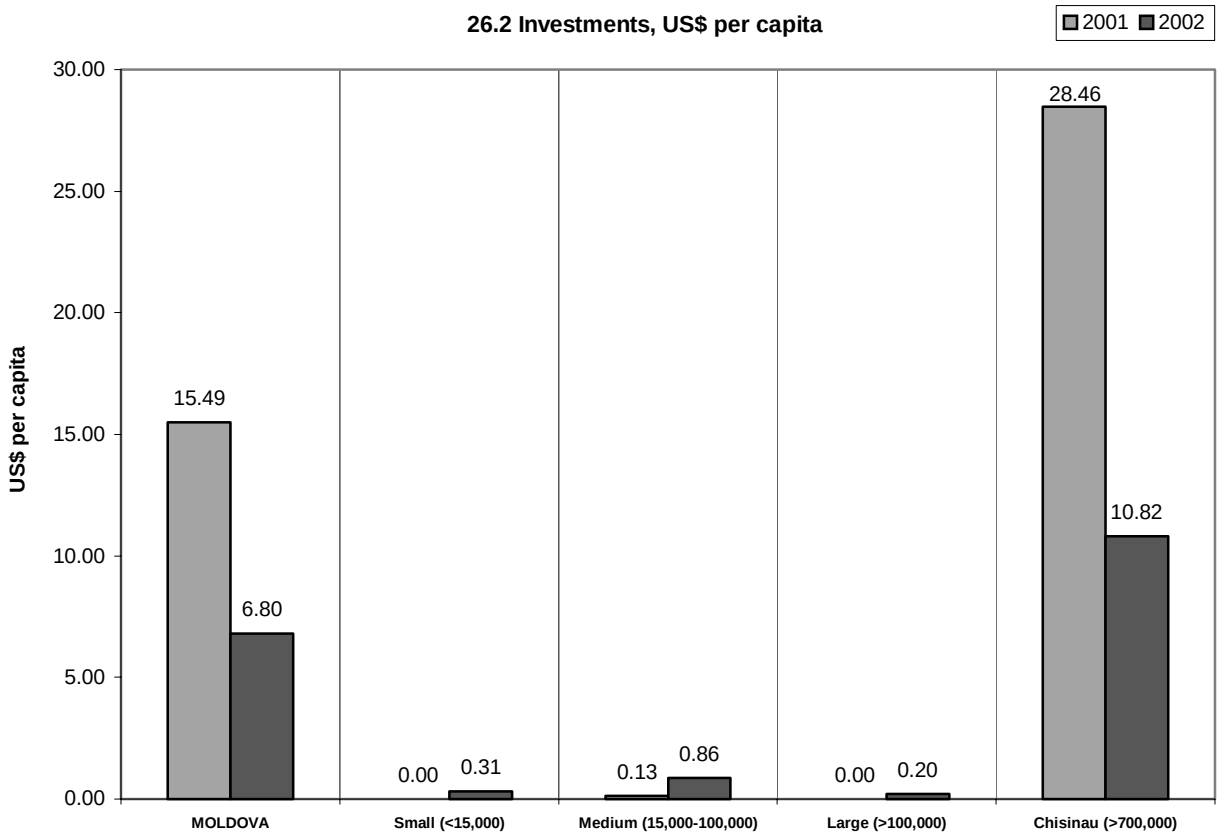
Average capital investments in Moldova declined from 59 to 29% (from 77 to 36% in Chisinau).

2002 marked some slight positive shifts in the investment area in small and medium towns, with the indicator increasing by 3 and 7 points for small and medium towns, respectively, and by 1 point in Balti.



Indicator 26.2 (Capital investments (in US$) per capita served) provides an estimate of average investments in the sector.

As total investments in 2002 reduced significantly, Indicator 26.2 declined from US$ 15.49 to US$ 6.80 per capita. The highest investment rate was reported in Chisinau, however compared to 2001 it also reduced, from US$ 28.46 to US$ 10.82.

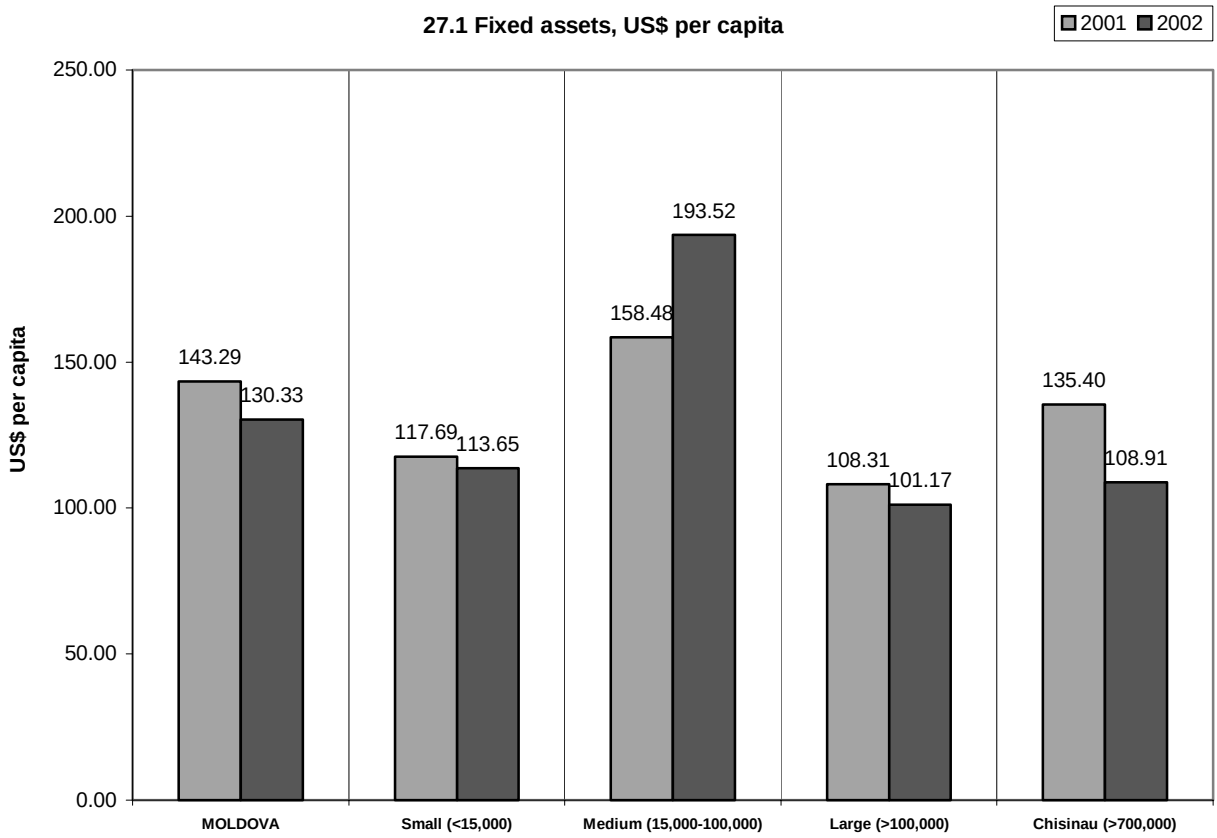


Fixed assets per capita (Indicator 27.1)

Indicator 27.1, expressed in US Dollars per capita, provides general information on the value of utilities' fixed assets and changes therein. This indicator exhibited a clear and strong downward trend across Moldova, with a decrease from US$ 143.29 to US$ 130.33, and similar dynamics in town groups.

At small-town utilities, fixed assets per capita reduced from US$ 117.69 to US$ 113.65, while in medium towns this indicator significantly exceeded the average for all utilities, with growth from US$ 158.48 to US$ 193.82. In Chisinau and Balti, Indicator 27.1 also demonstrated a consistent downward trend.

This indicator provides no tangible economic information.


27.1 Fixed assets, US$ per capita
2001
2002
US$ per capita
250.00
200.00
150.00
100.00
50.00
0.00
143.29
130.33
117.69
113.65
158.48
193.52
108.31
101.17
135.40
108.91
MOLDOVA
Small (<15,000)
Medium (15,000-100,000)
Large (>100,000)
Chisinau (>700,000)

Conclusions

1. The analysis of indicators provides extensive information on the available scope of water and sewerage services, the technical condition of networks and the financial situation of the surveyed utilities, while also making it possible to assess sector development in terms of individual utilities, town groups and on a nation-wide basis, identify communities with water and sewerage networks in critical condition, and prioritize investments required for their overhaul.

2. Urban water coverage remains low at 58%, 65-66% and 72-73% in small, medium and large towns, respectively. Only in the capital city of Chisinau coverage reaches 90.4%. In 2001-2002, water coverage in all towns except Chisinau remained at 2000 levels, i.e. no new networks and connections were commissioned.

3. The situation with sewerage coverage is even worse: 35-36%, 39-40% and 55-56% in small, medium and large towns, respectively, and 75.9% in the capital city. The analysis of Indicators 1.1 and 2.1 revealed that water and sewerage service development was funded by centralized special-purpose allocations along with industrial development, hence in large towns coverage is much higher than in small urban communities.

4. Water production and consumption over the analyzed period continued to decline. Nation-wide consumption reduced by 16.5%. In small towns, average annual unit consumption (in liters per person daily) totaled about 50.0 liters, dropping to as low as 14.0-25.0 liters in some communities (Leova, Straseni, Glodeni, Soldonesti), an indication of the critical condition of local water and sewerage infrastructure.

5. The nation-wide ratio of unaccounted-for water to total water produced increased in 2002 by 0.5% to 42.2%. Within town groups, the increase varied from 13.0% to 53.0%. In certain towns, Indicator 6.1 reaches 59.0-60.0% (Balti, Straseni, Stefan voda). The analysis of Indicators 6.1 (unaccounted-for water), 9.1 (pipe breaks) and 10.1 (sewerage blockages) testifies to further deterioration of water and sewerage networks. In some towns, the networks are in critical condition.

6. Metering is yet to become common practice in Moldova, however 2002 marked a major growth in the number of metered connections, averaging 31.0% across the country. In town groups, the proportion of metered connections in 2002 ranged from 27.0% to 58.0%. At the same time, the growing number of meters did not bring about the anticipated decline in unaccounted-for water or an increase in metered billings (Indicators 6.1, 7.1 and 8.1). The analysis of these indicators points to low quality of the water meters used and the metering system in general.

7. All participating utilities reported 100% wastewater treatment in the two surveyed years. At the same time, the quality of treatment declined, especially in small towns, due to:

- reduced uninterrupted water service and wastewater volumes;
- significant deterioration of treatment facilities and utilization of inefficient obsolete equipment.

In 7 towns (Chainari, Cantemir, Cricova, Telenesti, Stefan voda, Briceni, Donduseni), structural damage and equipment failure rendered biological treatment facilities inoperative.

Immediate major investments are required to restore and upgrade sewers.

8. 2002 saw further growth of energy costs per cubic meter of drinking water and cubic meter of wastewater collected and disposed. This indicates depreciation of pumping and power equipment and its low efficiency because of physical wear and excessive capacity given the scaledown in operations.

9. The financial indicators revealed some general trends in the financial/economic and investment areas, but for efficient investment targeting additional analysis is required so as to assess the financial sustainability of utilities.

10. Considering that water and sewerage sector is an energy-intensive industry, it would make sense to supplement the Costs and staffing indicator with an additional measure (Energy costs as a proportion of operational costs) to assess the efficiency of operations in terms of energy costs and estimate the advisability of and potential return on investments in utilities' energy infrastructure.

11. Under the World Bank methodology, average tariff is calculated for water and sewerage services taken together. It appears more practicable to introduce separate indicators for water and sewerage to reflect the actual price levels for these different services.

12. The indicators do not include an index for amortization (depreciation charges), which constitutes the source of funding for full replacement of property, plant and equipment. The scarcity of budget allocations for water and sewerage utilities makes depreciation (amortization) the sole source of equipment modernization. The omission of these expenses from production costs distorts the financial performance of utilities.

Appendices

Operational and financial performance indicators
Definition of terms

A. Coverage
A.1 Indicators

	Indicator	Unit	Definition
1.	Water coverage	%	[Population with access to water services (either with direct service connection or within 200m of a standpost)]/[total population under utility's nominal responsibility], expressed in percentage.
2.	Sewerage coverage	%	[Population with sewerage services (direct service connection)]/[total population under utility's notional responsibility], expressed in percentage.

A.2 Discussion

Coverage is a key utility indicator. Both coverage indicators are calculated using data on population. The need to estimate populations served by standposts will affect the confidence that can be placed in the water coverage indicator.

Coverage indicators provide insights into the development of the water and sewerage network infrastructure but not the quality of service. This issue is discussed in Section G (Quality of Service).

B. Water production and consumption
B.1 Indicators

	Indicator	Unit	Definition
3.	Water production	daily liters per person; cubic meters per connection per month; cubic meters per household per month	Total annual potable water supplied to the distribution system (including purchased water, if any) expressed by population served per day; by connection per month and by household per month.
4.	Water consumption	daily liters per person; cubic meters per connection per month; cubic meters per household per month	Total annual water billed (including purchased water, if any) expressed by population served per day; by connection per month and by household per month.
5.	Metered water consumption	cubic meters per connection per month; cubic meters per household per month	Total annual metered water consumed, expressed by population served per day; by connection per month and by household per month.

B.2 Discussion

Theoretically, the 'best' water consumption indicator is expressed in daily liters per person. However there is an issue with the reliability of source data. Particularly:

- lack of accurate (i.e. metered) water consumption data due to the absence of universal metering;
- poor, or out of date, census data.

While the population data may be inaccurate and need improvement, utilities are often more confident in the number of connections in their system and the number of households (apartments) they supply. In addition, water production figures may be more indicative of the real picture than those for water consumption.

The large number of considered indicators serves to draw on various sources of data so as to allow trending analyses within a utility. A comparison of summary data for several utilities is somewhat more complicated, given the different mix of household sizes and dwellings served by one connection. This is especially the case between utilities in different countries. However, given the homogeneity of household size within a country, these indicators allow sound utility comparisons to be made.

C. Unaccounted-for water

C.1 Indicators

	Indicator	Unit	Definition
6.	Unaccounted-for water	%; cubic meters per km per day; cubic meters per connection per day	Difference between water produced and water billed expressed as a percentage; volume of water 'lost' per km of water distribution network per day; and volume of water 'lost' per water connection per day.

C.2 Discussion

Unaccounted-for water represents water that has been produced but is 'lost' before it reaches the customer metering station (either through leaks, theft via unauthorized connection, or through legal but non monitored usage). Part of this unaccounted-for water can be saved by appropriate technical and managerial actions, and then used to meet currently unsatisfied demand (and hence increase revenues to the utility), or to preserve capital by avoiding capital investments in capacity extension.

There is a debate as to the most appropriate measure of unaccounted-for water. A percentage approach is not entirely correct, as it can make performance indicators of utilities with compact networks and high consumption look better than those of utilities with low levels of consumption and extensive networks. To capture these differences, three indicators are used for reporting unaccounted-for water.

D. Metering practices

D.1 Indicators

	Indicator	Unit	Definition
7.	Proportion of metered connections	%	Number of connections with operating meter to total number of connections, expressed in percentage.
8.	Proportion of water billed per meter readings	%	Volume of water billed per meter readings to total volume of water billed, expressed in percentage.

D.2 Discussion

Metering actual consumption is considered good practice. It allows customers the opportunity to control their water bills, and provides utilities with tools and information to better manage their systems.

These two indicators provide two separate perspectives on the issue, both of which are relevant in their own right. Taken together, the indicators provide insights into the effectiveness of a metering installation strategy: the ratio of indicator (8) to indicator (7) indicates the extent to which a utility is targeting large water users for metering as the highest priority.

E. Network performance

E.1 Indicators

	Indicator	Unit	Definition
9.	Pipe breaks	Annual breaks per km	Number of pipe breaks per year expressed per line km of the water distribution network; and per number of connections.
10.	Sewerage blockages	Annual blockages per km	Number of blockages per year expressed per line km of sewers; and per number of connections.

The number of pipe breaks, relative to the scale of the water distribution system, is a measure of the ability of the network to provide an uninterrupted service to customers. The number of breaks can be normalized by the length of the network and the number of connections.

The rate of breaks per line km can be seen as a rough estimate of the state of the network, although it may reflect maintenance practices as well. It must be recognized also that reporting for the whole length of a network can hide the fact that certain sections of the network may be perpetually failing, whilst the remainder is in reasonable condition.

Sewer blockages are, likewise, a measure of the ability of the sewer network to provide an uninterrupted service to customers. Blockages can reflect a number of issues including operations and maintenance, hydraulic performance of the network, and the general condition of the pipes.

F. Costs and staffing

F.1 Indicators

	Indicator	Unit	Definition
11.	Unit operational cost	US$ per cubic meter billed; US$ per cubic meter produced	Total annual operational costs[1]/Annual water billed. Total annual operational costs[1]/Annual water produced.
12.	Staff per thousand water connections Staff per thousand water and sewerage connections Staff per thousand water population Staff per thousand water and sewerage population	Number Number Number Number	Total number of staff expressed as per thousand water connections; per thousand water and sewerage connections; per thousand water service population and per thousand water and sewerage service populations.

	Indicator	Unit	Definition
13.	Labor costs as a proportion of operational costs	%	Total annual labor costs (including social contributions and benefits) expressed as a percentage of total annual operational costs[1].
14.	Proportion of contracted-out services	%	Total cost of services contracted-out to third parties / Total annual operational costs[1], as a percentage.

[1] *Operational costs exclude depreciation, loan interest and debt service/repayment.*

F.2 Discussion

Unit operational costs provide a 'bottom line' assessment of the mix of resources used to achieve the outputs required. The preferred denominator related to operational costs is the amount of water billed. This ratio then reflects the cost of providing water at the customer take-off point.

Lack of universal metering, doubtful accuracy of many household meters, and a focus in the past on water production, mean that an alternative measure of operational cost per cubic meter of water produced is also relevant in the short term.

Staff costs are traditionally a major component of operating costs. Understanding staffing levels can often give a quick guide to the extent of overmanning in a water utility. While preferable to allocate staff to either water or sewer services, this information is often not available. The staff ratios therefore use both the number of water connections, and the total number of water and sewer connections as denominators. Comparisons are best made between utilities, which offer the same scope of service both in terms of total size, and mix of water and sewer service. Note that with increasing use of outside contractors (see Indicator 14) the emphasis on staff numbers will become less relevant. At the current time, on emerging markets and in the developing world, it is still a very important indicator.

The number of people served per connection varies from country to country depending on the urban pattern and different approaches to service connections. To facilitate international comparisons of utility performance a denominator of populations served is used. The relative weight of labor costs is captured in Indicator 13. Utilities are often overstaffed and this measure provides insights into the impact of changes in future staff numbers.

Ratio 14 quantifies the degree to which outside (private) contractors are used to provide services. Contracting out is seen by many as one route to improve utility performance.

G. Quality of service
G.1 Indicators

	Indicator	Unit	Definition
15.	Continuity of service	Hours per day	Average hours of uninterrupted service per day for water supply.
16.	Number of water and sewerage service complaints	% of water and sewerage connections	Number of annual water and sewerage complaints expressed as a percentage.
17.	Wastewater treatment	%	Proportion of treated wastewater (including screening) in total water disposed.

G.2 Discussion

Historically, in the analysis of utility performance only limited attention has been paid to measures to improve the quality of service provided to customers. Hence there is a particular focus on these indicators of performance monitoring.

The measures presented above are a limited first step in the process of capturing information on quality of service. Complaints, while relatively easy to track, give only a glimpse of actual company performance - consumers may have become accustomed to poor service and do not complain. In other instances there may be poor, or non-existent, mechanisms in place to report complaints. Capturing at least some customer derived data, however, is considered an important starting point.

Collection of wastewater does not mean that the waste is treated before discharge back to the environment. This indicator will provide an understanding of the amount of effluent that is discharged without treatment by the utility.

A more comprehensive set of quality of service indicators could be developed but the likelihood of the data being collected by many utilities is limited in the short term. Expansion of the set is therefore a medium to long-term objective.

H. Billings and collections

	Indicator	Unit	Definition
18.	Average tariff	US$ per cubic meter p.a.; US$ per connection p.a.; US$ per household p.a.	Ratio of annual revenues to water billed; by number of connections and by households served.
19.	Water charges as a proportion of per capita income	%	Water charges as a proportion of per capita income, expressed in percentage.
20.	Fixed monthly charge	US$ per connection p.a.; %	Fixed annual connection charge (if any) and its proportion in the annual service charges.
21.	Ratio of industrial to residential charges	%	The average charge per cubic meter of water for industrial customers compared against the residential customers.
22.	Connection charge	US$ and % of per capita income for water and sewerage	The cost of connection to the water system as a proportion of gross income per capita, expressed in percentage.
23.	Collection	Months	Year-end accounts receivable as a proportion of total annual revenue, expressed in average collection months.

H.2 Discussion

Information on payments for water and sewerage services is very important. As in other indicators, unreliable actual consumption information necessitates the use of multiple measures for average tariff (i.e. per cubic meter, per connection, and per household).

High tariffs reflect the degree sewerage service costs. On the other hand, the average tariff does not reflect the scope of service and types of services provided by different utilities, and any comparisons should take this into account.

Average tariffs need to be put in the perspective of affordability. Income data, however, is not easy to obtain. The indicator selected, therefore, compares average tariffs and per capita income.

Per capita income is the average indicator for a whole country, and does not reflect local variations, but is considered adequate for the broad comparisons to be made at the current time. Inter-country comparisons will be hindered by the variable relationship that exists between GDP per capita and income, but the trend within a country will provide insights into changes in the relative cost of water and sewerage services.

Some utilities use fixed charge components irrespective of consumption. Such tariffs can adversely affect low-volume water consumers. On the other hand, they protect the revenue stream to the utility in periods when consumption is highly variable. Comparison of the fixed component with the average tariff will give a good indication for water bill estimates.

The proposed indicator factors in the existence of cross-subsidies between industrial and residential consumers. It should be noted that subsidies are a complex multi-faceted issue, and this indicator provides only a simplistic assessment of their scope for any given utility.

Paying for the service is an on-going process. For many consumers, the cost of connecting to the network can be a significant financial hurdle. Comparing connection charges may provide insights onto the scope of this problem. The cost of connection is a particular issue for poorer sections of the community. The indicator provides the absolute level and as a proportion of GDP per capita.

Billing customers and getting paid are two different things. The effectiveness of the collections process is measured by the amount of outstanding accounts receivable at year-end compared to the total billings for the year. This indicator is expressed in month equivalents.

I. Financial performance

I.1 Indicators

	Indicator	Unit	Definition
24.	Working ratio	Numerical value	Annual operational costs to billings.
25.	Debt service ratio	% of billings	Debt service expressed as a percentage of total annual billings.

I.2 Discussion

These indicators have been selected from a much larger range of financial indicators, which illustrate financial parameters, such as liquidity, profitability and cost efficiency. They help answer two important questions:

- Do revenues of the utility exceed its operating costs?
- What is the proportion of debt service costs?

J. Capital investment

J.1 Indicators

	Indicator	Unit	Definition
26.	Investments	% of billings; US$ per capita	Total capital investments expressed as a percentage of billings and per capita (in US$).
27.	Fixed assets per capita	US$ per capita	Fixed assets per capita (in US$).

J.2 Discussion

Investment will fluctuate from year to year, and the indicator selected will reflect this variation. An inter-utility comparison will likely have a great range of values. An analysis over a period of several years, however, will produce the average scope of investments in the water and sewerage sector.

The capital intensity of the utility is captured by the last indicator. Unfortunately there is usually limited information available about fixed asset values, hence this indicator must be treated with caution.

List of utilities covered by the indicative survey, grouped by service area population

Locality	Population	Utility
Group I - small towns (15,000 residents max)		
Floreni	4.03	Municipal enterprise "Floreni-Service", village of Floreni
Chainari	4.4	Municipal enterprise "Apă-Canal", Chainari
Lipcani	6.2	Municipal housing and utility enterprise, Lipcani
Cantemir	6.8	Apă-Canal Operational Administration, Cantemir
Cojusna	7.0	Apă-Canal Operational Administration, village of Cojusna
Otaci	7.3	Municipal enterprise "Housing and Utility Operational Administration", Otaci
Stauceni	7.5	Municipal housing and utility enterprise, village of Stauceni
Cricova	7.6	Municipal housing and utility enterprise, Cricova
Soldonesti	7.7	Municipal enterprise "Sercom", Soldonesti
Telenesti	8.6	Apă-Canal Operational Administration, Telenesti
Criuleni	8.7	Municipal enterprise "Comunservice", Criuleni
Stefan voda	9.1	Apă-Canal Operational Administration, Stefan voda
Ocnita	9.3	Housing and Utility Operational Administration, Ocnita
Briceni	9.6	Municipal housing and utility enterprise, Briceni
Donduseni	10.4	Apă-Canal Operational Administration, Donduseni
Leova	11.4	Municipal enterprise "Housing and Utility Operational Administration", Leova
Anenii Noi	12.0	Apă-Canal Operational Administration, Anenii Noi
Glodeni	12.2	Municipal housing and utility enterprise, Glodeni
Basarabeasca	13.0	Apă-Canal Operational Administration, Basarabeasca
Rezina	13.7	Municipal enterprise "Apă-Canal", Rezina
Riscani	13.7	Apă-Canal Operational Administration, Riscani
Singerei	14.7	Apă-Canal Operational Administration, Singerei
Group II - medium towns (15,000-100,000 residents)		
Taraclia	15.4	State enterprise "Apă-Canal Operational Administration", Taraclia
Floreşti	15.5	Joint Stock Company "Servicii Comunale Floreşti", Floreşti
Vulcanesti	16.0	Apă-Canal Operational Administration, Vulcanesti
Nisporeni	16.1	Municipal enterprise "GAAC", Nisporeni
Calaras	16.8	Apă-Canal Operational Administration, Calaras
Falesti	18.4	Apă-Canal Operational Administration, Falesti
Hincesti	18.4	Municipal enterprise "Water Supply and Sewerage Utility", Hincesti
Straseni	20.3	Municipal enterprise "Apă-Canal", Straseni
Chauseni	20.7	Housing and Utility Operational Administration, Chauseni
Drochia	21.5	Municipal water and utility enterprise, Drochia
Ceadir-lunga	23.3	Municipal enterprise "Apă-Canal", Ceadir-lunga
Comrat	25.6	Apă-Canal Operational Administration, Comrat
Edineti	26.9	Apă-Canal Operational Administration, Edineti
Orhei	37.1	Municipal enterprise "Regia Apă-Canal", Orhei
Soroca	38.9	Municipal water and sewerage administration, Soroca
Ungheni	40.0	Apă-Canal Operational Administration, Ungheni
Cahul	41.1	Municipal enterprise "Apă-Canal", Cahul
Group III - large towns (over 100,000 residents)		
Balti	150.6	Municipal enterprise "Regia Apă-Canal", Balti
Group IV - capital city (over 700,000 residents)		
Chisinau	771.0	Joint Stock Company "Apă-Canal Chişinău", Chisinau municipality

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